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JPRS Report

Nuclear Developments



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JPRS-TND-89-010

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PRC Abides by Nuclear Nonproliferation Treaty
OW0905114289 Beijing XINHUA in English
0020 GMT 9 May 89

[Text] United Nations, May 8, (XINHUA)—The fourth conference to review the implementation of the treaty on the non-proliferation of nuclear weapons (NPT) will be held in Geneva from 20 August to 14 September, 1990, it was announced here today.

The decision was made by the preparatory committee which has just concluded its first session in New York. Signatory states will discuss at the Geneva conference the status of NPT implementation since it came into effect in March 1979.

Earlier review conferences were held in 1975, 1980 and 1985 respectively.

The treaty is aimed at halting the spread of nuclear weapons by setting out a legally-binding declaration for countries which have ratified or acceded to it.

It was negotiated in Geneva at the conference on disarmament and was opened for signature in July 1968. One hundred and thirty-eight countries designated as non-nuclear-weapon states are party to the treaty.

China, though not a signatory, has repeatedly stated that it abides by the principles of nuclear non-proliferation.

The preparatory committee has requested background papers for the review conference from the U.N. secretary-general, the International Atomic Energy Agency, the Agency for the Prohibition of Nuclear Weapons in Latin America and the South Pacific Forum.

UN Envoy on PRC Position on Arms Transfers
OW1205011389 Beijing XINHUA in English
0017 GMT 12 May 89

[Text] United Nations, May 11 (XINHUA)—Chinese Ambassador for Disarmament Fan Guoxiang made a 9-point statement here today on the question of international arms transfer at the Disarmament Commission during its deliberations on conventional disarmament.

This is the first time that China has made known its positions on this issue at the United Nations in a comprehensive and detailed manner.

As member states have expressed different views on this issue in recent years, China's statement today attracted much attention from other delegations. The Disarmament Commission is going to publish a working paper containing the nine points which were submitted by China earlier in the week as an official document of the General Assembly.

The commission, currently meeting in New York, is a deliberative body of the General Assembly with the participation of all U.N. member states.

The 9-point position statement by Fan Guoxiang is as follows:

1. The question of international arms transfer should be addressed with a serious, discreet and responsible attitude. The transfer of arms must serve to safeguard the independence, sovereignty and territorial integrity of the states concerned, and to contribute to the maintenance of their necessary and reasonable defense capability. No country should interfere in the internal affairs of others by means of arms transfer.
2. The international arms transfer should help the people in their just struggles against colonial domination, foreign aggression and occupation and for the realization or restoration of their inalienable rights to national self-determination and independence.
3. The international arms transfer should be conducive to preservation and enhancement of peace, security and stability in the regions concerned and the world at large.
4. Strict prohibition of all types of arms transfer should be applied to those states or regimes which, in violation of the United Nations charter and the basic norms governing international relations, subject other countries to aggression, expansion and military occupation and practice racism and colonial domination. The countries concerned should take vigorous measures to stop international arms transfer which is related to such illegal acts as drug trafficking and international terrorism and to strengthen international cooperation in this respect.
5. The question of the international arms transfer should be addressed in conjunction with the questions of reducing international tension, removing regional conflicts, checking arms race and realizing disarmament under effective supervision.
6. On the basis of compliance with the above-mentioned principles, rational regulation and limitation of international arms transfer could be made so as to promote stability at a low armament level and enhance world peace and security.
7. The biggest arms supplier countries bear a special responsibility in regulating and limiting international arms transfer, and they should be the first to take actions. The United States of America and the Union of the Soviet Socialist Republics should take the lead in adopting concrete and effective self-restraining measures, including drastic reduction in their arms exports, so as to create favourable conditions for consultations and negotiations among all arms supplier and recipient countries on the rational regulation and limitation of international arms transfer.

8. The arms supplier and recipient countries, as well as other countries concerned, should be encouraged to carry out consultations and negotiations on an equal footing based on the principle of undiminished security of all the parties and other relevant principles as contained in the final document of the first special session of the United Nations General Assembly devoted to disarmament, and reach agreement on the rational regulation and limitation of international arms transfer.

9. The United Nations should play a useful role in rationally regulating and limiting international arms transfer. For instance, it should urge the biggest arms supplier countries to discharge their special responsibility and take the lead in adopting self-restraining measures, it should encourage all states to carry out consultations and reach agreement on the rational regulation and limitation of arms transfer and provide necessary consulting and technical services to them, and it should initiate studies and formulate necessary and effective measures against such arms transfer which should be prohibited.

Shanghai's Zhu Rongji Attends Nuclear Conference
*OW2104165689 Shanghai City Service in Mandarin
2200 GMT 16 Apr 89*

[From the "Morning News" program]

[Text] The essential component reactor parts of the first nuclear power station with a capacity of 300,000 kilowatts, designed and built by China, passed state-level inspection and acceptance in Shanghai on 16 April. A total of more than 180 people from the China Nuclear Industry Corporation, the Shanghai Nuclear Power Office, the Qinshan Nuclear Power Company, and other units attended the meeting for inspection and acceptance.

The Shanghai Machine Tool Plant No 1 undertook the job of producing the essential component reactor parts, which is one of the core parts of a nuclear reactor and which is an internationally recognized difficult job for the production of nuclear power installations. It is also one of the three installations of the 300,000 kilowatts-capable Qinshan Nuclear Power Station that have to pass state-level inspection and acceptance. The whole essential component reactor parts are composed of 15,056 spare parts and have a total weight of 85 metric tons. The three largest parts among them weigh 30 metric tons. The Shanghai Machine Tool Plant No 1 built and altered 10 special production facilities and 450 sets of special technological facilities by itself in the process of test production. The task of producing the complete facilities was fulfilled 1 and ½ months ahead of schedule. The quality of the facilities fully meets the design specifications for similar products in foreign countries.

Mayor Zhu Rongji attended and spoke at the 15 April [as heard] meeting of state-level inspection and acceptance.

Testing of Nuclear Bomb Denied

*OW0405113189 Beijing Domestic Service in Mandarin
0930 GMT 4 May 89*

[Report on the 4 May Foreign Ministry briefing from the "National Hookup" program]

[Text] A reporter asked: An Indian newspaper recently reprinted a report from British (Reports on Foreign Affairs), saying that China will test a nuclear bomb for Pakistan in the near future. What are your comments on this?

The spokesman of the Foreign Ministry said: As everyone knows, China does not advocate nor encourage nuclear proliferation. China also does not engage in developing or assisting other countries to develop nuclear weapons. The report on China's plan to test a nuclear bomb for Pakistan is a sheer fabrication.

Fears About Nuclear Safety

51004004 Hong Kong SOUTH CHINA MORNING POST in English 1 Apr 89 p 2

[Article by Carol Lai, S.Y. Wai, and Daphne Cheng]

[Text] Concern grew in Hongkong yesterday over China's ability to build two nuclear plants at Daya Bay without outside involvement.

Work on a second nuclear power plant at Daya Bay, where a \$28.8 billion station is already under construction, could begin as early as next year, a senior Chinese nuclear official announced in Beijing yesterday.

If everything goes smoothly, the two 1,000-megawatt reactors proposed for the second plant could become operational in 1995—three years after the scheduled commissioning of the Daya Bay nuclear power plant, he said.

The Sino-Hongkong advisory committee on the safety of the Daya Bay plant would be allowed to extend its monitoring role to the second plant. But the executive director of the environmental pressure group, Friends of the Earth, Miss Linda Siddall, described the plan as "horrifying".

She said China's plan to construct a plant without outside help would add to worries over nuclear safety because China lacked the relevant experience.

"We have been objecting to the first Daya Bay plant since 1983 and the second plant will be doubling all the risk with China's poor track record in construction and industrial safety," she said.

The proposal was also attacked by Hongkong's anti-nuclear power lobby, the Joint Conference for the Shelving of the Daya Bay Plant, which plans to hold a weekend press conference on the issue.

Mr Jiang Shengjie, a technical adviser to the Chinese Nuclear Industry Development Corporation, said the Guangdong Water Conservancy and Power Department was conducting a feasibility study on the planned \$23.4 billion project.

He said the study, which would include contingency and safety aspects of the project, would be completed in three months and construction would begin in a year if the State Council gave the plan the green light.

Mr Jiang said that a second power plant at Daya Bay would not compromise safety, though the two installations could merely be "tens of meters" apart.

He dismissed the need for additional contingency measures and added that evacuation in the event of a major nuclear mishap would only be necessary within a 30 kilometer radius of the site.

"The distance between two plants does not matter. What matters is whether there will be access between them," he said.

He added that international nuclear safety standards did not stipulate the minimum distance between two nuclear power plants. Some cities overseas had up to eight such plants in close proximity.

Mr Jiang said China would manage the second plant and he did not rule out the possibility of having the participation of foreign consultants.

Meanwhile, a member of the Daya Bay Nuclear Power Station Nuclear Safety Consultative committee cast doubts about China's ability to build a nuclear power station without overseas involvement.

Dr Raymond Yeung Man-kit, a University of Hongkong lecturer in mechanical engineering, said the committee had learned from Chinese officials through informal discussions about the proposal.

But he said committee members did not know a second plant would be built in Daya Bay alongside the existing one.

"We are talking about experience and experience is not something that can be accumulated overnight."

"China definitely has no experience in building large scale 1,000 megawatt nuclear reactors and they may not know how to handle the project," Dr Yeung said.

The committee was set up last August by the Guangdong Nuclear Power Joint Venture, which oversees the existing project, to advise the company on the safety of the plant.

Controversy About New Daya Bay Plant Continues

Growing Dissent in Hong Kong

51004005 Hong Kong SOUTH CHINA MORNING POST in English 4 Apr 89 p 3

[Text] Local members of a Sino-Hongkong nuclear safety advisory committee will hold an emergency meeting on Thursday to discuss China's controversial plan to build a second atomic station at Daya Bay.

The meeting was called by former legislator Wong Po-yen, who heads the 14-member Nuclear Safety Consultation Committee, the body monitoring safety aspects of the Daya Bay nuclear power station.

Many of the 12 Hongkong members on the panel, including Mr Wong, have publicly denounced China's proposal to install two Russian-made 1,000 megawatt pressurized water reactors at Daya Bay.

Committee member Professor Poon Chung-kwong, who supported the first scheme two years ago, yesterday also joined the growing chorus of dissent and urged China to shelve plans for a second plant.

"We accepted the first plant because we know the French nuclear facilities to be installed there have a clean track record. But I can't say whether the Russians are equally qualified."

"Hongkong has just recovered from the Daya Bay confidence crisis. It will certainly be politically unwise to develop one more plant so close to Hongkong," said Professor Poon, who is also the head of Hongkong University's Science Faculty.

Another member, Dr Raymond Ho Chung-tai, called on the Chinese authorities to furnish the panel with more details about the second plan.

Dr Ho, a Hongkong Institutions of Engineers ex-president, said the enormous local concern over the project should be considered irrespective of whether the scheme would be beneficial.

He urged China to think again before finalizing its \$23.4 billion investment on an additional atomic station at Daya Bay.

Both Professor Poon and Dr Ho will be away on Thursday, but colleague Mr Leung Tin-pui said he would pass on anxiety over the scheme.

Mr Leung, who heads Hongkong Polytechnic's Mechanical and Marine Engineering Department, said: "I agree that there is an established need for nuclear energy in China. I have no doubts about the safety aspects of building two nuclear plants next to one another as there are precedents elsewhere."

"But technological factors are not the only consideration. I will raise the concern over whether it is necessary to build the second plant at Daya Bay."

China should also be sensitive to the psychological impact on the Hongkong population, he added.

The Daya Bay committee was appointed by the Guangdong Nuclear Power Joint Venture Company last July to advise it on the safety aspects of its \$28.8 billion atomic power scheme.

The panel, however, has not been officially informed of China's plan to put an additional station next to the one now being developed about 30 kilometers northeast of the border.

Meanwhile, the director of the Friends of the Earth, Miss Linda Siddall, yesterday urged Executive and Legislative Councillors to oppose the plan.

She denounced the proposed second station as an "added threat" to the territory.

Miss Siddall was worried that it would be difficult to monitor operational safety as Hongkong would not participate in the scheme.

She said her group would close ranks with the 117-group anti-nuclear lobby—the Joint Conference for the Shelling of the Daya Bay Nuclear Plant—next week to work out a series of protest actions, including petitioning the Office of members of the Executive and Legislative Councils and the Hongkong branch of the New China News Agency.

She cast doubts over China's need for more nuclear stations as a major hydro-electric project is being developed in the southwest province of Guangxi.

The development of the \$39 billion Hangzhou River project includes 10 power stations with a combined generating capacity of 10 megawatt hours.

"Chinese officials have said the scheme would generate sufficient electricity for the entire southern China, so Daya Bay should really be a back-up facility rather than a main power source," Miss Siddall said.

On the long-term development of energy, she said her group wanted China to improve its rail network to better distribute coal from the north to the rest of the country.

Soviet Technology To Be Used

51004005 Hong Kong SOUTH CHINA MORNING POST in Engl'sh 4 Apr 89 p 20

[Editorial]

[Text] Plans by China to consider using Soviet nuclear technology in the second phase of development of the Daya Bay power station has aroused local alarm in Hongkong, but it is more significant as a testimony of China's shift in its foreign policy. A nuclear reactor deal, expected to be signed during Mikhail Gorbachev's summit with Deng Xiaoping in Beijing next month, is the most dramatic, but by no means the only, scientific exchange that the two countries have in mind. Sino-Soviet cooperation in space and medical research is also in the offing.

The main reason why China has opted for Russian technology is economic, as it involves less direct credit transfer from China, where the control of state spending is a high priority in the new budget. Instead of paying for Soviet reactors, which China hopes to install in Guangdong and Liaoning—provinces which are experiencing rapid growth, and need more energy—the power units will be offered on a barter basis. With the Soviet Union eager to export, and to court Chinese friendship, the terms of the deal are unusually favorable, and are regarded as a test of the Kremlin's sincerity about improving ties.

All of these factors will carry far more weight in Beijing than the concern being expressed in Hongkong, firstly about the expansion of the Daya Bay development, and then about the use of Soviet technology, instead of the French expertise applied to the first phase.

In both instances, that concern relates to safety, with the most vocal critics opposed to the concept of nuclear energy, not simply its use in Guangdong. In the same way that Hongkong, before 1997, is entitled to make its own decisions on issues like the nationality status of certain Vietnamese refugee children, so is China within its rights in determining how to tackle its power supply shortfall, irrespective of opinion across the border. The volume of controversy generated by the progress of the first power station at Daya Bay means that any decision to expand it will be portrayed as politically insensitive, but one can assume that China and the Soviet Union, post-Chernobyl, will be equally anxious to avert a radiation mishap.

Campaigners in Hongkong cannot expect to have a monitoring role on where another country chooses to build its nuclear power stations, any more than a European country should expect to prevent a neighboring state from developing a station just across the frontier. There are no published plans for a Hongkong company to be involved in the second phase, so it is literally none of our business—unless or until it goes badly wrong.

China continues to covet Western technology and science, but the transfer of these has been hampered by the reluctance of some countries, notably the United States, to collaborate in greater depth with a communist Government. There have been improvements, such as the recent agreement by the US to allow Chinese rockets to launch American satellites. But the Soviet Union is now proving a more cooperative source of information and assistance.

French Banks To Finance Daya Bay Power Station

HK1005035489 Beijing CHINA DAILY in English
10 May 89 p 2

[By staff reporter Liu Hong]

[Text] Four French banks yesterday entered a contract with the Bank of China in Beijing to provide \$196 million in loans to finance a pump storage power station at the Daya Bay Nuclear Power Station in Guangdong Province.

The pump storage facility, first of its kind in China, is designed to make full use of the power generated by the Daya Bay Nuclear Power Station, which is expected to go into operation in 1992 with a designed annual power yield of 10 billion kilowatt hours.

The capacity of the nuclear power station has been geared to the daytime need for power by local factories, businesses and other activities. The nuclear power station will work with the same capacity during the night, when the demand for power is lower.

To prevent waste, the pump storage power station will use the nighttime power produced by the nuclear power station to pump water so the water can then be used to produce electricity during the day, explained Alain Flet, vice president of the Energy, Mining and Special Industries Division of the Credit Lyonnais.

This Paris-based bank has acted as a leading manager in the co-financing for the project. The money provided by the four French banks is part of a mixed credit. The other part of the credit is financial aid and a grant from the French Government, according to an official from the Ministry of Foreign Economic Relations and Trade (Mofert).

The French Government signed a protocol with the Chinese Government at the end of April, promising a total of nearly 1.7 billion francs in financial aid to China this year, the Mofert official said.

A vice president from the Bank of China told people attending the contract signing ceremony that the pump storage power station project is a high priority in the nation's energy development plan.

The pump storage power station comprises two generating units with 600 megawatts each, according to Zhou Yingqi, an official from the Bank of China.

The Bank of the European Union (Banque de l'Union Européenne), another Paris-based bank, opened its representative office in Beijing on Monday.

Jean-Paul Dessertine, the bank executive vice-president, told CHINA DAILY that his bank has been engaged in supporting ventures leading in the energy and telecommunications industries in France.

Cold Nuclear Fusion Experiments Continue

HK0905052889 Beijing CHINA DAILY in English
9 May 89 p 5

[By Yang Xiaoping]

[Text] As some prestigious American physicists appeal to their colleagues to cool down the fusion fever that has been raging in the scientific world since late March, a group of Chinese scientists from Beijing Normal University are continuing their experiments, aiming to clarify the cold-fusion issue.

In a 15-square-metre laboratory in the university's Institute of Low Energy Nuclear Physics in northwest Beijing, the physicists, together with several chemists, are carrying out their sixth experiment. The first experiment was conducted on April 18, 26 days after Stanley Pons and Martin Fleischmann announced their achievement of nuclear fusion at room temperature in an experiment in Utah, in the United States.

Professor Huang Zuzia, honorary director of the institute and a member of the Chinese Academy of Sciences, said that the Chinese researchers expect to use convincing scientific experiments to prove whether the reported phenomenon was nuclear fusion or not.

Nuclear fusion is the process of fusing two nuclei of light chemical elements to form a heavier nucleus and release energy. It is the reverse of nuclear fission, in which energy is produced by the splitting of heavy atomic nuclei into lighter fragments.

Energy from nuclear fusion was first exploited in a relatively uncontrolled manner in the production of the hydrogen bomb in the early 1950s. Then scientists around the world began to search for ways to produce energy through nuclear fusion in a controlled way, since a fusion reaction could produce a huge amount of energy that would be clean, cheap and virtually inexhaustible.

Later, large devices were constructed with the aim of making nuclear fusion occur in a controlled way, but high temperatures and complex equipment are required. Since the energy is released in a controlled manner and

the reaction takes place at a temperature above 100 million degrees Centigrade, the process is described as a "controlled thermonuclear fusion reaction."

The costliness and complexity of working on such a reaction have led scientists to seek another method.

A break-through was announced on March 23 by two electrochemists, Pons of the University of Utah and his British colleague, Fleischmann of the University of Southampton. Based on five years of research, the two electrochemists claim that they achieved fusion in an electrolytic cell containing "heavy water" rich in the hydrogen isotope deuterium. A platinum anode and a palladium cathode were installed in the water.

Pons and Fleischmann said that fusion occurred when deuterium atoms accumulated around the palladium electrode. And they also said that the fusion reaction produced helium and tritium atoms, neutrons and a release of energy. The presence of neutrons, helium and tritium atoms are believed to signify cold fusion.

Because the fusion reaction took place at room temperature, it became known as "cold fusion."

Afterwards, laboratories from many countries began to attempt to corroborate the experiment, which one scientist called "the most important discovery after fire." Then reports of success came from laboratories in Italy, the Soviet Union, Poland, Hungary, Japan and South Korea.

Among the labs that have experimented with cold fusion experiments in China, the Beijing Normal University's Institute of Low Energy Nuclear Physics, the Nuclear Physics and Chemistry Institute under the China National Nuclear Industrial Corporation and the Institute of Chemistry under the Chinese Academy of Sciences first claimed positive results.

Positive Results

Scientists from Beijing Normal University claimed that two of their five completed experiments—the second and the fourth—showed positive results. The other three experiments were either disturbed by an accelerator or failed in terms of reaction time.

The apparatus for the experiment was described as being similar to that used by Pons and Fleischmann. They put a palladium cathode and a platinum anode in 200 cubic millimetres of heavy water.

During their second experiment, the scientists counted the production of 100 excess neutrons and 40 excess tritium atoms. And they achieved a better result during their fourth experiment.

"About 23 hours after the beginning of the experiment, we counted 3,312 neutrons and 54 tritium atoms during an hour and a half," a scientist said.

"Some scientists deemed that heavy water in northern China contains tritium, so we can't conclude that the tritium is produced by fusion," the scientists said.

"But if the fourth experiment can be repeated, it means a fusion reaction took place."

Now working with a theoretical model of a cold fusion reaction, Huang said, "If the cold fusion phenomenon was definitely affirmed by experiments, theoretical explanation would not be impossible.

"But we have to be more cautious with our future experiments. We will put questions to ourselves," continued the professor, who has been engaged in nuclear physics research since he graduated from Qinghua University in 1948.

Liu Boli, a chemistry professor at the same university, said that a convincing experiment in cold fusion reaction should be tested by measuring four things: neutrons, gamma rays, tritium and calorimetry.

"Calorimetry measurement is difficult, but we have to do it if we are to achieve a definitely positive result," Huang said.

Even if the experiment is confirmed, he predicted that "we still have a long way to go before it can be put to practical use."

Yang Liming, a physics professor at Beijing University, said that although their results were uncertain, Pons' and Fleischmann's experiment gave nuclear physicists some ideas.

According to the traditional theory in nuclear physics, Yang explained, when two deuterium atoms are at a distance of 10 to the -8 power centimetre from each other, they repel each other. But when they are apart by 10 to the -12 or the -13 power centimetre, they attract each other and create a fusion reaction.

The usual method of narrowing the distance between deuterium atoms is to increase pressure and temperature.

But cold fusion tries to increase the density inside a lattice of deuterium atoms so as to create a special environment for the deuterium atoms' attraction.

The source of cold fusion—deuterium—is rich in sea, river or lake water. Scientists say that the deuterium extracted from a cubic metre of sea water could generate as much energy as 10 tons of coal.

"If cold fusion were successful, it would be a great contribution to mankind," Huang said.

JAPAN

Government Approves Uranium Enrichment Plant

OW1605063089 Tokyo KYODO in English
0237 GMT 16 May 89

[Text] The Atomic Energy Commission approved plans Tuesday to build a prototype uranium enrichment plant this year that uses new technology to produce cheaper fuel for nuclear plants, the Science and Technology Agency said.

The plant, to be built in Okayama Prefecture, western Japan, is to use rotors made of lightweight carbon fiber reinforced plastic, instead of the metal rotors used in conventional plants.

The new technology is expected to reduce the cost of enriching uranium by 10 to 20 percent, according to Tsuyoshi Ogawa, chief of uranium enrichment at the Science and Technology Agency.

Currently the price of uranium enriched in Japan is about 40 percent higher than international prices.

Japan hopes to become self-sufficient in uranium enrichment to improve its energy security, Ogawa said.

The pilot plant is to be constructed jointly by the governmental Power Reactor and Nuclear Fuel Development Corp. and the Japan Nuclear Fuel Industries Co., a consortium of electric companies.

The private sector will pay for 85 percent of 10 billion yen project.

Operation of the pilot plant, slated for construction at Ningyo Toge mountain pass is scheduled to start in 1991. Ogawa declined to discuss the plant's production capacity.

The plant will serve as a prototype for construction of commercial facilities using the same technology at Rokkasho-mura, Aomori Prefecture, in northern Japan.

The commercial facilities using the new material are to enter operation between 1995 and 2001, and upon completion will be able to process enough uranium each year to fuel 7 plants, each with a 1 million kilowatt capacity.

The Atomic Energy Commission is chaired by Moichi Miyazaki, the minister of state for the Science and Technology Agency, and serves as an advisory organ to the prime minister.

CZECHOSLOVAKIA

Austrian Campaign Against Nuclear Plant Noted

LD2704093989 Prague CTK in English
1528 GMT 26 Apr 89

[Text] Vienna April 26 (CTK)—Various groups of people opposing nuclear power have launched a new campaign in Austria against the construction of the Czechoslovak power plant in Temelin, South Bohemia.

According to press reports, their representatives handed yesterday a memorandum demanding a halt to the power plant construction to Austrian Chancellor Franz Vranitzky.

The memorandum even demands that Austria make the continuing construction of the power plant impossible by withdrawing from the planned trade agreements between Austria's nationalized industry and Czechoslovak enterprises. Serious is the fact that the campaign is supported by Austrian Minister of the Environment Marlies Flemming.

Chancellor Vranitzky has promised to take a stand on the document, according to the APA news agency. In his first response he pointed out that Austria's nationalized industry has not enough orders and any limitation of trade would result in the loss of a number of jobs.

A spokesman for the Czechoslovak Foreign Ministry recalled last year's decision of Austria's Supreme Court to allow a lawsuit against the construction of nuclear power plants in Czechoslovakia and stressed that such a decision is in sharp contrast with the principles of international law. He also pointed out that similar actions do not help create good neighbourly relations.

The new wave of the campaign against Czechoslovak nuclear power industry indicates that good neighbourly relations remain to be the thorn in the flesh for some people and groups in Austria.

Propaganda against Czechoslovak nuclear power plants is being waged almost incessantly. It is linked with demagogic arguments or naive offers of 'aid', thus deceiving people who object to nuclear energy for various reasons. Nevertheless, it is characteristic that Austrian opponents of nuclear energy concentrate only on Czechoslovakia and completely ignore nuclear power plants in Western Europe.

Austrian Protests of Nuclear Plant Dismissed

AU0305073289

[Editorial Report] Prague RUDE PRAVO in Czech on 28 April on page 2 carries a 600-word interview with Antonin Krumnikl, CSSR minister of fuels and power, by Igor Sirota entitled "Safety of Nuclear Power." In the interview, the date and place of which are not given, Krumnikl responds to the current "campaign against the

Czechoslovak nuclear power industry" that has been launched by "certain groups in Austria." The minister first describes as a "gross untruth" a report in the Austrian daily KURIER (date not given) claiming that the CSSR is building 36 nuclear power stations. He points out that only two nuclear power stations (Jaslovske Bohunice and Dukovany) are presently operational, that another two (Mochovce and Temelin) are under construction, and that, within the framework of a bilateral agreement dating back to 1982, the Austrian side is provided with all necessary information about these. Speaking about Temelin, the main target of the Austrian "campaign," Krumnikl stresses that the safety of all four 1,000-megawatt units is "ensured in a novel fashion" and that the units' protective shells "make the reactor absolutely comparable with those built in Western countries." Krumnikl also notes that if the Austrian side makes an appropriate request, it will be permitted to visit the Temelin construction site to verify this on site.

Asked about his assessment of "Austrian statements directed against the Czechoslovak nuclear power," Krumnikl says that it is advisable to "proceed from facts and specific scientific knowledge" and "not to succumb to moods, emotions, and imprecise information." He also notes that Czechoslovakia exported 320 million kilowatt hours of power to Austria last year.

Public Access to Nuclear Power Plants Envisaged

AU1005170589 Prague RUDE PRAVO in Czech
5 May 89 p 2

[Article by (pp): "Safe Operations of Nuclear Power Plants; Winning Confidence by Providing Information"]

[Text] Prague (By our reporter)—On the basis of the findings of our State Supervising Agency attached to the Czechoslovak Atomic Energy Commission, it can be said that the demands on provisions for nuclear safety in our nuclear power plants and other nuclear installations have been adhered to. There has been no leakage of radioactive substances above the planned limit, nor did a situation ensue which would have led to such a leak.

Our nuclear blocks have operated reliably. Last year the number of unscheduled disconnections dropped to a mere 50 percent of their number in 1987. We had only nine disconnections in the eight reactors in operation. Only certain nuclear blocks in Japan and Canada show a lower average of unscheduled disconnections. This means that the reliability of our nuclear power plants has reached world standards.

The State Supervising Agency devoted particular attention to the two oldest blocks of the V-1 power plant in Jaslovske Bohunice. The preliminary report before starting operations, submitted more than 10 years ago together with the application for a permit to start operations, was based on calculation programs and methods which today can be mostly regarded as outdated. That is

why an instruction has been issued to amend the pre-operational safety report in keeping with the usual practices in similar cases abroad. A comprehensive check of provisions for nuclear safety has also been carried out in the V-1 nuclear power plant in Jaslovske Bohunice; it became the basis for many proposed measures, which include the introduction of a special operational regime, the purchase of more modern diagnostic appliances, etc. The special operational regime contains scope to vary the output of the nuclear power plant, envisages an increased number of inspections, etc. All this was based on the experience acquired in the operation of older nuclear power plants elsewhere in the world.

Serious concern about the development of the nuclear power industry has been apparent for some time both in neighboring countries and even among some of our own citizens. It seems that most such views are due to a lack of sufficient information. However, according to a statement made by Engineer Jiri Beranek, chief inspector of the State Supervising Agency of the Czechoslovak Atomic Energy Commission, at the Thursday [4 May] press conference in Prague, this situation should soon change strikingly. We want to make use of the knowledge acquired by the French Electric Power Association, currently engaged in carrying out one of the largest nuclear programs in the world, above all by applying its experience in influencing the public. This primarily involves making the nuclear power plants accessible to the general public, establishing a telephone information service, issuing regular reports on the development of

safety measures in the nuclear power plants, and maintaining closer contacts between supervising agencies and the communications media. Materials for setting up this information system for the public should be submitted to the CSSR Government as early as this year.

International cooperation in enhancing the safety of nuclear power installations is successfully continuing; in September 1989 the Dukovany nuclear power plant will be visited by a mission from the International Atomic Energy Agency.

POLAND

Minister Suspends Building of Nuclear Plant

LD2804145589 Zielona Gora Domestic Service in Polish 1400 GMT 28 Apr 89

[Text] Industry Minister Mieczyslaw Wilczek has informed the Gorzow, Pila, and Poznan Voivodas the following: Recognizing that a continuous and comprehensive consideration of Poland's nuclear power program is necessary and taking into account society's doubts and fears, I have asked the energy and brown coal community director general to immediately suspend preparations for building the Warta nuclear power stations in Klempicz, Pila voivodship.

The justification for this decision states, inter alia, that further decisions on the country's development of nuclear energy will be made on the basis of detailed and comprehensive analyses of the fuel and energy equation up to the year 2000.

ARGENTINA

Training, Technology Transfer Featured in Exports

51002051a Buenos Aires CLARIN in Spanish
2 Apr 89 p 15

[Article by Eleonora Gosman: "Argentine Reactor in Algeria"]

[Text] The experimental 1-megawatt reactor that is to be inaugurated today just a few km distant from the city of Algiers takes on particular meaning for Argentina's nuclear sector: To begin with, it is now the second such atomic complex Argentina has installed abroad, the Peru installation having been inaugurated in December. But also, it strengthens Argentina's negotiating position in talks already under way with several Third world countries.

The putting in service of the Nur—the baptismal name of the Algerian reactor—demonstrates several things: Argentina is capable of building nuclear installations offering maximum guarantees as to time, price and quality. The work in the present case was completed exactly within the 2 years called for by the contract, which was signed in 1985. Furthermore, Argentina does not limit its offering solely to providing a commercially operable installation, as is the style among the industrial powers—France, Germany, United States and Canada, for example. Argentina's offering, instead, includes an authentic technology transfer and the training of the receiving country's technicians.

The start of a second stage in Argentina's cooperation with Algeria has now been reached. Pending the beginning of operation of the pilot plant, in June, for the manufacture of fuel elements—the second part of this initial contract—talks are to begin on other projects. For the immediate term, these deal with the sale of a source of cobalt for medical uses. Intermediate-term plans would involve the assembly of a reactor for the production of radioisotopes and its corresponding plant.

But the most ambitious plan has to do with the Carem, a prototype of a compact, low-power—some 50 megawatts—nuclear power plant designed by the state-owned INVAP [Applied Research Institute], the prime contractor for the engineering and construction of the Algerian nuclear installations. This project was grounded by financial problems, but could be given a new lift by these negotiations. Conceptually, the Algerian ambassador in Buenos Aires, Abdala Feddal, implied his country's interest in this type of plant when he stated that, "It is ideal for such as the African underdeveloped nations which unable to count on excessively sophisticated technologies. For us, it makes no sense to install 1,000-megawatt plants, which is the size manufactured by the big powers," he pointed out.

It is clear that through all these steps, and looking towards the more distant future, the CNEA [National Commission for Atomic Energy], one of INVAP's owners, hopes to participate, around the end of the century, in the Algerian program calling for the installation of higher-powered plants. This will depend, of course, on how the Argentine nuclear plan unfolds, particularly insofar as concerns its fourth nuclear power plant and the line of reactors that will eventually be chosen.

Interest

The manner in which cooperation with Algeria has unfolded has awakened the interest of a number of other countries. Around the beginning of March, Buenos Aires was visited by a Syrian delegation headed by the president of that country's atomic energy body. The Syrians have an American-made experimental reactor fueled by 90-percent enriched uranium, now unobtainable on the world market, and need to modify the nucleus to accept 20-percent enriched uranium. Argentina is perfectly capable of doing this, in that the process is similar to the one being implemented in the reactor installed at the University of Teheran. Another delegation, from Saudi Arabia in this case, has just recently arrived to visit the various National Atomic Energy Commission's installations, for an insight into Argentina's national nuclear energy plan.

Of course, this does not exhaust the list of foreign contacts. Interest in the Carem project has also been indicated by Turkey. Specifically, the Parliament of that country voted recently to appropriate \$10 million for research in connection with a low-power nuclear-fueled generating plant. Since Argentina is the only nation currently engrossed in developing a plant in this class, it would not be unreasonable to suppose that some sort of association between the two nations could also be worked out.

Another promising aspect is international bidding being sponsored by United Nations bodies on the building of a small research-type reactor to be installed at the University of Tirana. Albania has expressed interest that Argentina is the supplier.

Foreign prospects could not be better. But the possibility for taking advantage of them will depend on a number of factors: The most important of these, of course, is the political resoluteness with which investments are made and the continuity of the nuclear plan is maintained. These conditions are basic if we are to avoid stagnation at the technological level we have attained thus far in the nuclear sector.

Importance of Nuclear Exports Under-scored

51002051c Buenos Aires CLARIN in Spanish
4 Apr 89 p 12

[Editorial: "Nuclear Exports"]

[Text] A few years ago Argentina's nuclear sector began exporting equipment and technology to underdeveloped

countries, thus opening a field of activity with a promising developmental outlook, provided it can count on the necessary support.

Towards the end of last year, a nuclear center for the training of technicians and the production of radioisotopes for export was inaugurated in the Peruvian city of Huarangai. Argentina was awarded the contract for the installation of this center, on the basis that its bid provided for more extensive transfers of technology and know-how than is customary in the nuclear trade. The only constraint imposed by the seller is agreement on the part of the buyer to devote the equipment to the production of nuclear energy for peaceful uses and the buyer's acceptance of the safeguards specified by the IAEA [International Atomic Energy Agency], whose inspectors monitor stocks of fissionable elements potentially usable for military purposes.

A new step has just been taken in the direction of exports, with the putting in operation of a 1-megawatt experimental reactor in the outskirts of Algiers, the capital of Algeria, as part of a scientific and technological cooperation agreement signed in 1984. A technology transfer and training of the receiving country's technicians are involved in this case as well.

This operation, while important in itself, also opens the possibility of increasing future sales. In immediate prospect, first of all, are the putting into operation, in June, of a pilot plant for the manufacture of fuel elements, and the sale of a source of cobalt for medical uses. The outlook for the near or intermediate future includes the installation of a reactor for the production of radioisotopes and its corresponding plant. And for the longer term, studies are under way on the possibility of exporting a low-power plant suited to the energy needs of small- or medium-sized countries. In this regard, Argentine production can penetrate a market whose demand matches our local productive capabilities.

Our national industry enjoys numerous ties in the nuclear sector with underdeveloped countries. Under an agreement signed with Iran, the American-made reactor core installed in the Tehran atomic center is being replaced. A contract with Cuba calls for the installation of a plant for the production of radioisotopes. Syrian, Turkish and Saudi Arabian delegations have expressed interest in acquiring of various types of equipment. And talks are under way with representatives of Rumania and Albania.

In sum, Argentina's nuclear industry, its researchers and its technicians, have succeeded in demonstrating their creative capabilities and international competitiveness, which could yield foreign exchange, domestic technological development, and benefits in terms of our relations with other countries.

Unfortunately, however, the results achieved to date are not the fruits of a coherent policy of growth in the nuclear sector. On the contrary, they have been achieved despite the numerous cutbacks in investments in this sector, which have led to the deterioration of local plants, and in some cases to their paralyzation for prolonged lapses.

In 1984 and 1985, our nuclear program suffered delays owing to budgetary cuts which resulted in the semi-paralyzation of the Atucha II and heavy-water plant projects. Subsequently, the CNEA [National Commission for Atomic Energy] received funds that enabled it to reprogram the continuation of these projects. But later, the restrictions reappeared. The consequences of this "disinvestment" policy and of the lack of adequate maintenance of Atucha I have become evident over the past few months, during the energy crisis.

The export operations realized and those that are under study speak for the potentialities of a sector that has not received the necessary support. This situation must be reversed so that Argentina's presence in the nuclear trade can attain the level of its potentialities and so that the plans our country has instituted can be carried out to completion.

Daily Endorses Nuclear Dump Protest
51002051b Buenos Aires *LA PRENSA* in Spanish
4 Apr 89 p 6

[Editorial: "Nuclear Waste"]

[Text] The highly developed countries, whose engagement in nuclear activities is intensive, are having to confront the problem of eliminating or disposing of the waste stemming from the reprocessing of uranium. Mirta Laciar, lawyer and vice president of the Argentine Ecological Movement, warned of the possibility that those nations could convert Argentina into a "nuclear dumping ground," pointing out that "there could already be an agreement signed with those nations providing for the evacuation of such waste." She stated that various Chubut communities, among them El Bolson, have issued warnings on the "need to be on the lookout for anyone showing up in our midst with power enough to carry out the plan to make Gaster-Chubut a nuclear dump."

In this regard, it is well to recall the existence of a report produced in Switzerland by the international Greenpeace organization. To some extent, this document confirms that possibility. It says that "The United States and the countries of Western Europe have, since 1986, both legally and illegally, dumped their waste in Brazil, East Germany, China, Guinea, Haiti, Hungary, Mexico, Nigeria, Lebanon, Namibia, Poland, Rumania, Sierra Leone, South Africa, Syria, Turkey and Venezuela."

Ms Laciari stated that since Argentina is one of the few countries in the world that has developed the nuclear technology it is now debating whether or not to locate a nuclear waste dump in Gaster. To do so would require "a highly controversial policy decision." She then cited the existence of two parliamentary bills, one in the National Chamber of Deputies and the other in the Buenos Aires Provincial Legislature, aimed at the control of nuclear residues, and pressured the lawmakers to come to an immediate decision on this matter.

There can be no doubt that preventing the possible dumping of atomic waste on the national territory is a matter of the utmost urgency. A "nuclear dump" is a potential danger, the prospect of which, no matter how distant it is in time, prompts natural concerns. In the future, when our two plants, Atucha and Embalse Rio Tercero, which are now at a virtual standstill, go into operation, our country will also be facing the problem of its own atomic waste. No proposal is acceptable that would result in use of our subsoil for the storing of that dangerous material, considering that a seismic movement, for example, could destroy all the safeguards against its dissemination.

The countries that deal in nuclear energy must devote their utmost, among other efforts, to research on ways to eliminate those lethal residues, which, depending on their size, can affect not just a village but all of humanity.

Constantini: Embalse Nuclear Plant Long Overdue for Maintenance

51002051d Buenos Aires LA PRENSA in Spanish
6 Apr 89 p 14

[Article: "Likelihood of Having To Shut Down Embalse Nuclear Plant Cited"]

[Text] Cordoba—During a press conference held at the Cordoba Engineer Center, the former president of the CNEA [National Commission for Atomic Energy], Alberto Constantini, warned that the current energy crisis will probably continue beyond the period being cited in government circles. He also indicated that, in July at the latest, the Embalse nuclear plant will have to undergo maintenance, during which it will not be producing electric power, thus depriving the National Interconnected System of the 600 megawatts the Embalse plant provides to the System.

Constantini, who resigned as chairman of the CNEA in 1987 because of the cuts in the CNEA's budget, disagreed with the national secretary of energy, Roberto Echarte, when the latter stated that the energy shortage could end this August at the latest. Constantini indicated that he sees no basis for Echarte's statement that the Atucha plant will resume operation on 27 June, the fact being that the situation at the Atucha plant is "an extremely difficult one, since a number of fuel channels

inside the pressure vessel have disintegrated. These channels, of which there are 25, are situated at a distance of 14 meters from the access opening of the vessel.

"Therefore," he added, "I hardly think it can resume production of power by the date Echarte has announced. It's going to be very difficult indeed to repair and reinstall the channels that are being removed. And what's more, I believe the real cause of the disintegration that has taken place has not been investigated."

Work at Embalse

As for the Embalse plant, he indicated that it has been a long time since that plant has been taken out of service for programmed repairs. This is complex work, since "each pressure tube is clamped in place by two rings which integrate it with the system." These tubes are displaced by the action of the atomic energy, and must therefore be put back in place.

He pointed out that when he was chairman of the CNEA, consideration was given to replacing them altogether. This required the purchase of a special tool from Canada, for which he was denied the necessary funds. As a result, he said, "when the time comes to effect the programmed repair, it may be found perforce necessary to replace them. And if this continues being put off, the time will come when the Embalse plant will have to be shut down for a period of 1 or 2 years, at a cost of approximately \$200 million."

In conclusion, he criticized the national Government for the delay in building Atucha II, which, at the present rate of progress, he says, will take another 10 years to complete.

Turkey Seeking Nuclear Energy Assistance

PY2804131389 Buenos Aires TELAM in Spanish
0843 GMT 28 Apr 89

[Text] Buenos Aires, 28 Apr (TELAM)—Atilla Azmena [name as received], chairman of the Turkish Nuclear Energy Agency, is on a visit to Argentina seeking to negotiate the installation in Ankara of an Argentine-made CAREM [expansion unknown] nuclear reactor.

In remarks to the morning newspaper EL CRONISTA COMERCIAL, Osmena praised Argentine nuclear development. He said that his country is trying to follow the same path of technological independence. He added that Turkey wants to jointly participate in constructing a 25-mw reactor.

The CAREM Argentine nuclear reactor is a low-powered reactor built for scientific purposes. It has been developed by the INVAP [Applied Research Institute] enterprise in Bariloche, and it is fueled with uranium enriched to 5 percent. Argentina recently installed a similar reactor in Algeria.

BRAZIL

Sonda-IV Rocket Successfully Launched on 28 April

PY2904134689 Brasilia Radio Nacional da Amazonia Network in Portuguese 1000 GMT 29 Apr 89

[Text] The Aeronautics Ministry yesterday successfully launched the Sonda-IV rocket, which is built in Brazil.

The Sonda-IV rocket was launched to test elements that will be used in the satellite launching vehicle (VSL). Experts at the Barreira do Inferno launch center said the launch surpassed all expectations.

This is the first time the hot system to separate the two stages of the rocket has been employed. This system improved the rocket's trajectory.

Filho on Rocket Guidance System Acquisitions

33420049n Sao Paulo FOLHA DE SAO PAULO in Portuguese 6 Apr 89 p A-10

[Article by Roberto Lopes]

[Excerpt] Brasilia—[Passage omitted] The new Air Force chief of staff, Brigadier General Cherubim Rosa Filho, said yesterday that "Brazil is going to acquire from China, France, Russia, and anywhere else possible" the technology for manufacturing a rocket guidance system—that being the chief difficulty facing the Ministry of Aeronautics' Space Activities Institute (IAE) as it tries to complete its development of a satellite launch vehicle (VLS).

Rosa Filho reported that a delegation from the Soviet Union's Air Force Command would arrive in Brazil next month to familiarize itself with the FAB's air bases and training establishments and the industrial plant serving Brazil's military aviation. Minister of Aeronautics Octavio Moreira Lima is placing greater hope for technological cooperation in the talks now underway with the Chinese.

The day before yesterday, he received a mission from the Chinese Ministry of Aviation in his office. "We are still engaged in very preliminary talks, but I anticipate that we will strengthen the close cooperation we already have with the Chinese and that we will do so in all areas of space science: that of satellites and that of launch rockets, especially as regards rocket guidance systems."

Rosa Filho also said that Brazil wanted a foreign technology which would permit development in the field of liquid propellants, which are much more powerful and unstable than solid propellants.

20-Percent-Enriched Uranium To Be Produced

51002049a Sao Paulo O ESTADO DE SAO PAULO in Portuguese 8 Apr 89 p 10

[Text] Sorocaba—By November, the Aramar Experimental Center built by the Navy in Ipero, 130 km from Sao Paulo, will be producing 20-percent-enriched uranium by the ultracentrifugation process. The maximum enrichment content achieved until now was 5 percent—insufficient, for example, to fuel the reactor of the submarine that Brazil is going to develop in Rio with the technology acquired from West Germany.

According to Rear Admiral Othon Luis Pinheiro da Silva, chairman of the Coordinating Agency for Special Projects (COPESP), a Navy agency that administers the Aramar Center, raising the enrichment content of uranium from 5 to 20 percent confirms Brazil's position among the few countries in the world that have completely mastered the nuclear fuel cycle. "The 20 percent-enriched uranium is the fuel we need to fuel our research reactors, including the one of the Institute of Energy and Nuclear Research (IPEN), which supplies radioisotopes for applications in medicine and which heretofore depended on imported fuel," Pinheiro da Silva revealed.

The 20 percent enrichment of uranium will be obtained by means of a series of latest generation centrifuges that are being installed in a unit built alongside the initial module used for 5 percent enrichment inaugurated last April.

According to Othon Ribeiro [name as published], Brazil also already has the technology to produce reactors with the power capacity of the nuclear electric power plants the country will need at the turn of the century to supplement its hydroelectric capacity.

The components of the first Brazilian nuclear reactor, the National Pressurized Water Reactor (Renap 01), with a power of 50 megawatts, are already being produced by national industry and the unit should be installed in Aramar at the beginning of the next decade. It will serve as a model for the reactors that are going to be installed in the future fleet of submarines and other Brazilian Navy nuclear-propulsion vessels.

Scientists and technicians involved in the nuclear program are also already designing a 60-megawatt reactor capable of producing power for a city with a population of up to 60,000 inhabitants, and its technology will be used in the production of 400- or 500-megawatt reactors. "These reactors are being developed with excellent safety systems, within the most modern concept existing in the world today," the rear admiral explained.

In the opinion of the COPESP chairman, the first year of Aramar's operations has transpired without problems, proof that "the equipment and the technology utilized for enrichment of the uranium are completely reliable." According to Pinheiro da Silva, up to now, the Brazilian

nuclear program has consumed \$251 million. Pinheiro da Silva considers that a modest sum if compared with the results obtained in terms of technological independence and development of the skills of technicians and industry. Brazil is one of the few countries that has mastered the fuel cycle.

Government Authorizes Yellow Cake Exports
51002049b Sao Paulo VEJA in Portuguese
29 Mar 89 p 40

[Text] The deficit-ridden Brazilian nuclear policy could enter a new economic stage—that of investments that pay. The government has just authorized Andrade Gutierrez Contractors to initiate an operation for the export of concentrated uranium—yellow cake—which will be extracted from Lagoa Real, a deposit in southern Bahia. Government and Andrade Gutierrez experts studying the world market in the strictest secrecy have already planned to ship the first consignments of yellow cake within 2 years. The parallel nuclear program, which is sponsoring the export of yellow cake, is also beginning to show results on other fronts. The Paranapanema Mining Company shipped the first 300 tons of zirconite to Mexico. Zirconite is a mineral that in a more processed stage is used for the manufacture of atomic rods—equipment for nuclear reactors. Paranapanema's timetable already includes deals for 170,000 tons of this material over the next 3 years, which will result in a profit of about \$60 million.

Physicist Views Cold Nuclear Fusion Research
51002049c Rio de Janeiro O GLOBO in Portuguese
3 Apr 89 p 7

[Text] Sao Paulo—Like some British and American laboratories, Brazil is also going to conduct research on cold nuclear fusion. According to the director of the Physics Institute of the University of Sao Paulo [USP],

Ivan Cunha Nascimento, if its economic feasibility is proved, cold nuclear fusion could beneficially replace nuclear energy and the power plants built for that purpose.

Nascimento said that Brazilian action to conduct research on the new process developed by American and British scientists depends on obtaining "heavy water," derived from the combination of oxygen and deuterium, one of the isotopes of hydrogen. Although the process for obtaining heavy water is simple, Brazil—unlike Argentina—never invested in its production. For that reason, it now depends on imports and the authorization of the National Nuclear Energy Commission (CNEN), inasmuch as its marketing is regulated by the International Atomic Energy Agency (IAEA).

The physicist considers the discovery more important than that of superconductivity because it makes feasible a much cheaper way of obtaining energy and, in the long term, could represent the solution for the energy problems of mankind, especially of the Third World countries. He explained that another advantage of the method is dispensing with high temperatures. All of the other nuclear fusion processes under development in the world require temperatures of at least 100 million degrees centigrade. In addition, it uses heavy water as fuel, a basic raw material that is cheap, abundant, available in nature (deuterium is found in the form of gas in the atmosphere) and, above all, nonpolluting.

According to Nascimento, the cold nuclear fusion process opens up, at least theoretically, an unprecedented possibility of domestic applications (such as a power generator for a home, for example), or as a substitute for the present fuels to power automobile motors.

According to his assessment, at least three Brazilian institutions have the capability to conduct research and develop the process: the USP itself, the Institute of Energy and Nuclear Research (IPEN), and the Federal University of Rio de Janeiro.

BANGLADESH

Nuclear Waste Allegedly Dumped in Bay of Bengal

Women's Organization Protests
51500119 Dhaka *THE NEW NATION* in English
19 Mar 89 p 8

[Text] "Nari Pakkha," a women's organization, yesterday expressed its grave concern over the reported disposal of toxic nuclear industrial wastes from some industrialised countries in the territorial waters of Bangladesh in the Bay of Bengal by an ocean-going vessel registered in Panama.

It felt that the reports about such disposal, if found factual and correct, were a cause for extreme anxiety. Such disposal is a grave offence against humanity and an infringement on the sovereign territorial rights of Bangladesh.

The organisation through a press release demanded that the government should immediately apprise the members of the public about the real situation.

Clarification Demanded
51500119 Dhaka *THE BANGLADESH OBSERVER* in English 18 Mar 89 p 10

[Text] National Awami Party (NAP) on Friday demanded a clarification from the government regarding reported dumping of nuclear waste by a U.S. vessel within Bangladesh territory. NAP jointly with other progressive parties would resist such anti-people activities of the Government. Professor Muzaffar Ahmed and Mr Ponkoj Bhattacharya, President and General Secretary respectively of NAP expressing concern said if such waste is dumped, natural environment would be seriously affected.

EGYPT

Officials Deny Interest in Nuclear Weapons

JN2704161889 Manama *WAKH* in Arabic
1410 GMT 27 Apr 89

[By Faruq Shukri]

[Text] Baghdad, 27 Apr (WAKH)—A senior Egyptian official has denied Western allegations of an Egyptian interest in the production of weapons of wholesale destruction.

Egypt's state minister for military production, Dr Jamal al-Sayyid, emphasized his country's commitment to its international obligations in this regard.

He told a press conference to mark his country's participation in the first Baghdad military fair that Egypt has no plans to produce nuclear or chemical weapons.

Meanwhile, Egypt's Ambassador in Baghdad Ibrahim 'Awf, who was present at the press conference, called such statements groundless fabrications.

Certain non-Arab states in the region are behind these rumors to create a smokescreen behind their nuclear effort, 'Awf said.

"If cold fusion were successful, it would be a great contribution to mankind," Huang said. The ambassador noted that Egypt has signed all of the international treaties banning nuclear weapons and has allowed an inspection of its facilities by world organizations.

He further denied allegations of a joint Egyptian-Iraqi-Argentinian effort to produce a rocket with a nuclear warhead, calling them tendentious rumors.

Egypt has not joined in any such program and has not entered into any such project with Iraq, the ambassador added. Such allegations have been initiated by a regional power that fails to abide by international conventions and has a nuclear program and engages in aggression. The aim is to divert attention from evil programs it is preparing for the region and to find pretexts for aggressions against states in the region, the minister said.

Egypt has suspended the production of electric power from its nuclear reactors, he added.

Along with Jordan and Saudi Arabia and the host nation Iraq, Egypt is taking part in the fair which opens tomorrow.

The Egyptian state minister confirmed the reported U.S. objections to the displaying of jointly produced articles at the fair and noted that the moratorium applies to certain types of vehicles rather than to arms. This will have no impact on Egyptian-produced articles, he said.

The value of Egypt's production of the Military Industrialization Organization for last year was 1.2 billion Egyptian pounds, including 85-million-pounds worth of military products, said Al-Sayyid.

The minister stressed that his country and Iraq are cooperating in the production of weapons, noting that the cooperation predicated the launching of the Arab Cooperation Council.

Official Discusses Nuclear Energy Capability
JN0505152189 Cairo *AL-AHALI* in Arabic
3 May 89 p 1

[By Ahmad Judah]

[Text] Dr Hamid Rushdi, chairman of the Atomic Energy Commission, has stated that Egypt will not stand idly by vis-a-vis Israel's attempts to introduce nuclear weapons to the region. In a statement to AL-AHALI, Rushdi added that while Israel's claims that the Arabs possess nuclear warheads are sheer lies, this does not

mean that Egypt lacks the needed experience and the scientific manpower to respond to "Israel's nuclear arsenal." Egypt is carefully watching Israel's nuclear activities, which constitute a serious threat to the Arab region.

Dr Rushdi pointed out that Egyptian industry is capable of manufacturing 50 percent of the equipment for nuclear reactors and Egypt's capability in this regard is currently being raised to become 100 percent. He said that the civilian and military industries in Egypt are coordinating in order to respond to any external blockade to stop Egypt's atomic industry or prevent the realization of our national self-reliance in terms of nuclear technology.

INDIA

Editorial Assails U.S. Pressure Over Missile
BK2504142189 Bombay NAVBHARAT TIMES in
Hindi 18 Apr 89 p 1

[Editorial: "Already Under Fire"]

[Text] India is yet to test fire its first 2,500-kilometer range missile "Agni" [fire], but it has already ignited a fire of jealousy in some countries. Attempts are being made to prevent India from testing the Agni. The United States is the most concerned of all of them. The senior officials of the Bush administration have admitted that the United States is very worried and has told India that the Agni test could take the warmth out of the relations. The arguments given by Democrat Senator Jeff Bingaman against India's ballistic missile program reflects this concern.

Senator Bingaman says that if India carries out this test, it will damage its image as a world's leading peace-loving nation. He believes that Sino-Indian relations will definitely deteriorate because China's major cities will come within the striking distance of the Agni, while the new phase of relations recently begun with Pakistan will deteriorate and the old arms race will be rekindled.

Senator Bingaman should know that it has been years since China built its medium-range nuclear missiles. Its short-range "Silkworm" missiles had already become a dangerous weapon in Iranian hands during the Gulf war. Saudi Arabia has received Chinese missiles, while others like Syria are waiting in the wings. On the other hand, Pakistan recently successfully tested 80-kilometer and 300-kilometer range missiles. Is New Delhi not within the striking distance of Chinese and Pakistani missiles? If Sino-Indian and Indian-Pakistani relations are witnessing an upward trend irrespective of the presence of these missiles, why should these relations cool down after the firing of Agni?

India should improve its relations as long as it is weak, but a strong India invites objections from America. This is a strange reasoning. Why is America bothered about

India's peace-loving image? Obviously, these are mild arguments. If the United States cannot give up its "Star Wars" program and stop modernizing short-range nuclear missiles in Europe in spite of extraordinary peace signals from Moscow, why should India stop? The United States, in fact, is afraid of India's becoming a decisive force in South Asia.

The Bush administration, following the footsteps of the Reagan administration, believes that it is the responsibility of the United States to prevent the spread of missile production in the world. First of all, the testing of Agni does not mean that India wants to join the arms race. And even if it were so, who has given this responsibility to the United States? A member of the U.S. Senate's Armed Services Committee, John McCain, recently said that legislation should be passed limiting dealings with countries like India, Pakistan, China, and Libya who are engaged in missiles production.

U.S. Vice President Dan Quayle had already prepared a formal report on means to prevent Third World countries from producing missiles. In this context it is possible that the United States becomes provoked and Pakistan and China begrudge this month's planned test in Orissa, but India should remain firm because the cruel fact is that only when we look strong are we respected.

U.S. Criticism of Missile Program 'Unfair'
BK3004080489 Delhi Domestic Service in English
0730 GMT 30 Apr 89

[Text] India has told the United States that it is unfair on Washington's part to single out her ballistic missile program for criticism. The Indian ambassador to the United States, Mr P.K. Kaul, has told the Bush administration that there was no logic in singling out India when several other countries have developed similar missiles without attracting sanctions.

Moves are afoot in the U.S. Congress to impose trade sanctions against India for developing ballistic missiles. The Indian ambassador told the under secretary of state, Mr Robert Kimmitt, that India's missile program is purely an indigenous effort meant for the country's development.

U.S. Pressure on Missile Program Charged
BK0405085889 Delhi Domestic Service in English
0830 GMT 4 May 89

[Text] In the Lok Sabha today, a strong plea was made for a discussion on the alleged attempts by the United States to pressurize India from launching its Agni missile program.

Raising the issue during zero hour, a CPI-M [Communist Party of India-Marxist] member drew the attention of the house in this regard to a report that the Senate subcommittee has asked the U.S. Administration not to

supply certain sophisticated equipment to India. The speaker, Mr Bal Ram Jakhar, said he will ask the government about the report.

Ballistic Missile Test Launch Delayed
*BK0105085889 Delhi Domestic Service in English
0830 GMT 1 May 89*

[Text] The test firing the country's first ever intermediate range ballistic missile—Agni—has again been postponed following detection of a data error in one of its subsystems. A Defense Ministry spokesman said in New Delhi today that the error was detected by the computer during the final stages of the automatic count down sequence.

The spokesman said the mission authorities decided to postpone the launch to rectify the error and continue with their efforts.

Ballistic Missile Test Rescheduled for 1 May
*BK2704112089 Hong Kong AFP in English
1102 GMT 27 April 89*

[Text] New Delhi, April 27 (AFP)—India will again try to launch its first ballistic missile on May 1 after aborting the blast-off four times this month, the PRESS TRUST OF INDIA (PTI) reported Thursday.

India's intermediate range ballistic missile (IRBM), called Agni (fire), is scheduled to be launched between 6:00 a.m. (0030 GMT) and 3:00 p.m. (0900 GMT) on May 1 from the Chandipur area, 150 kilometres southwest from Calcutta, PTI said.

Technical snags that led to the postponement of Agni's launch four times since April 20 have been rectified and the missile is ready for the trial, the news agency quoted official sources at the launch pad as saying.

The missile, which has a range of 2,500 kilometres, is targeted to land in the Bay of Bengal between Sri Lanka and India's Andaman group of islands.

PTI said administrators of eastern Orissa state had warned civilians living near the launch site that Agni's blast-off was now scheduled during the first two weeks of May.

Missile experts postponed Agni's launch during the last moments of a final countdown on April 20 following technical snags believed to be in the IRBM's ignition systems.

The test fire was cancelled three more times in as many subsequent days because of unspecified reasons amid rumours that anti-missile protesters had sabotaged power cables to the launch pad.

Resistance from some 10,000 villagers had scuttled Agni's launch in the past because of fears that it could lead to destruction of homes and crops.

The Indian Government says it would pay 80 rupees (five dollars) to each of the farmers who are asked to temporarily abandon their home and lands at the time of Agni's launch, but most Chandipur residents have rejected the offer.

Former Minister: Baliapal May Be Nuclear Base
*51500117 Calcutta THE STATESMAN in English
16 Mar 89 p 7*

[Text] The proposed missile test range at Baliapal in Orissa will ultimately be utilized by the country as a nuclear weapons base given the open nuclear policy of the Government and the threat of submarines carrying nuclear warheads in the Indian Ocean, according to Mr Samarendra Kundu, the former Minister of State for External Affairs, in Calcutta on Wednesday. The Janata leader, who was addressing a symposium on the test range at Calcutta University, said that the massive investment of Rs 12,000 crores for the project pointed at something bigger than just a missile test range.

Mr Kundu, who is connected with the people's movement to scrap the plan for the test range in the Baliapal area, said that the Centre had gone ahead with their plans even after Mr Rajiv Gandhi had promised to visit the area before finalizing the proposal. Mr Brindaban Raj, president of the Khsepanastra Ghati Birodh Committee, who resides in Baliapal, said that the people of the region were firm in their resolution not to leave their homes. He said that Government officials and security personnel had to enter the area with the local people's permission.

The former Vice-Chancellor of Calcutta University, Mr Sushil Mukhopadhyay, said that there were efforts by the powers that be to destabilize the people's movement and the Orissa Government had joined hands with the Centre in this respect. Mr D. K. Sinha, Pro-Vice-Chancellor of the university, urged the leaders of the movement to make the struggle successful by adopting a scientific approach in obtaining public opinion. Mr Budhdhadev Bhattacharya, the university's Dean of Arts, labelled the proposal for the test range as another effort to deprive the poor of their democratic rights. He and the other speakers stressed the need to create awareness throughout the country.

Medium Energy Heavy Ion Accelerator at Tata Institute
*51500118 Madras THE HINDU in English
15 Mar 89 p 19*

[Text] A medium energy heavy ion accelerator facility has been set up at the Tata Institute of Fundamental Research, Colaba, Bombay, jointly by BARC and TIFR.

This facility is based on a Tandem Van de Graaff accelerator with terminal voltage going up to 14 million volts. Starting from a proton it can accelerate any ion. This is the first accelerator facility in the country to accelerate heavy ion beams to sufficiently high energies needed for advanced research in nuclear physics. Variety of experimental facilities have also been built to pursue research programmes with this facility in newly emerging areas of nuclear physics.

Reportage on Commissioning of Narora Nuclear Plant

Assurance of Safety

51500116 Bombay THE TIMES OF INDIA in English
16 Mar 89 p 5

[Text] Bombay, March 15—The population around the Narora atomic power plant, though larger than the population near other atomic power stations in the country, faced no hazards and the siting of the plant was in keeping with international norms, according to Dr M.R. Srinivasan, chairman of the Atomic Energy Commission.

France had 40 times more nuclear power stations compared to India in an area which was just as big as Maharashtra. Japan had located its nuclear power plants surrounded by thick population, Dr Srinivasan pointed out, while inaugurating the third national symposium on operating experience of nuclear reactors and power plants here today.

The site selection committee had taken into account the seismicity in the area and the plant was designed to withstand severest earthquakes. The late Dr A.K. Ganguly who was in the site selection committee did not reject the site but preferred another site at that time. He gave second place to Narora and wanted designs to be developed before siting a nuclear reactor at Narora, Dr Srinivasan said.

Referring to reports in a section of the press, expressing concern over the siting of the giant nuclear reactors at Koodankulam in Tamil Nadu, Dr Srinivasan clarified that not a single person will be displaced within a 2-km radius of the plant and no land was being acquired from any person. No agricultural activity was noticed in the area for the last 15 years and fishing would not be adversely affected, he said.

Commenting on the apprehension that the nuclear power stations were vulnerable to bombing by enemy nations, Dr Srinivasan said that way not only the nuclear power plants, which are a few hundreds all over the world, but huge refineries, chemical and fertiliser plants and other sensitive installations could also be bombed. Simply, no plant could ever be set up if such an isolated view was taken, he opined.

Nuclear power plants, which were like any other complex machinery, faced problems and Indian nuclear power plants too had their share. Turbine failures at Madras atomic power station which were too frequent. Leaks on collant channels and other tubes were among the challenging problems faced by Indian scientists and engineers.

"While we had the capacity to pool our expertise and find solutions, the solutions should be found faster as loss of each day's power generation meant a huge financial loss," Dr Srinivasan said. He urged nuclear scientists to anticipate the problems and be prepared to attend to them quickly.

By demonstrating the reliable, safe and efficient operation, the nuclear power plant operator could set at rest the controversy over the expansion of nuclear power and prove to the public the beneficial aspects, Mr A. Veeraghavan, chairman of the symposium committee, said.

Director on Plant's Features

51500116 Madras THE HINDU in English
14 Mar 89 p 7

[Article by Shri S.K. Chatterjee: "Improved Design Features of Narora Atomic Power Station"]

[Text] The reactors at the Narora Atomic Power Station (NAPS) are the first of the standardised 235 MWe units and twelve such units are being constructed in the country as part of the 10,000 MWe nuclear power programme. The Narora design is also being extrapolated for the twelve numbers of 500 MWe size units that would be set up in the country. The Narora design incorporates the current international safety features, including earthquake resistant design as per the requirements of the International Atomic Energy Agency. Significant design improvements have also been made in the NAPS reactors based on component manufacturing, construction and operating experience from the earlier reactors at Rajasthan and Madras. With the improved design, safety and reliability will be of higher order and maintenance will be easier and heavy water losses will be reduced. The major improvements/modifications are outlined below.

Seismic Design

Since NAPS is located in a seismic zone, extensive analysis work has been done to evolve appropriate seismically qualified designs for various structures and components. The seismic parameters for the site has been evolved in consultation with the prestigious Dept. of Earthquake Engineering, Roorkee, and other national institutes. Two levels of earthquake viz. safe shutdown earthquake for safety related systems, and an operating basis earthquake for systems required for plant operation have been defined. Earthquake shock absorbers and

other restraining devices have been incorporated to ensure integrity of piping and alignment of components during postulated seismic events.

Reactor Shutdown System

The improved reactor shutdown system, one of the most important safety systems, incorporates two independent fast acting shutdown devices in line with current international trend. These systems consist of fourteen mechanical shut off rods for primary shutdown system and twelve liquid poison tubes as secondary shutdown system. All the components in the system have been tested for very high reliability. However, the system design ensures that even if individual components were to fail, the systems will remain effective. For coarse power control, four shim rods are provided to replace the moderator level control function. With these provisions the reliability increases by orders of magnitude.

Double Containment System

The containment system incorporates several improved features, chief among them being the full double containment with purging arrangement for the inter-envelope space so as to maintain a negative pressure in the secondary containment. This feature would significantly reduce ground level of radioactivity during postulated accident conditions. Also incorporated is a primary containment filtration and pump back system for long term clean up in the containment atmosphere following an accident. Due to double containment system the radiation doses at the plant boundary following a postulated design basis accident will be a small fraction of limits specified by the regulatory authorities.

Reactor Coolant System

This system circulates high temperature high pressure heavy water to transport heat from the fuel to the steam generators. The system circuit has been simplified by having a smaller number of large sized components. The NAPS coolant system has only 4 circulating pumps and 4 steam generators as against 8 pumps and steam generators in earlier reactors. The resulting reduction in number of welded joints and valves would reduce heavy water leaks. In Rajasthan and Madras reactors, steam generators consist of a number of small hair-pin type heat exchangers connected to a common steam drum. In NAPS, these are replaced with four steam generators of mushroom type with integral steam drum. These steam generators allow better in-service inspection and also use better corrosion resistant tube material (incoloy 800 instead of monel). A shutdown cooling system with its own pumps, to be run with emergency power supply provides cooling to the fuel during shutdown conditions.

Emergency Core Cooling System

The Emergency Core Cooling System (ECCS) is required to cool the core and prevent fuel damage in the unlikely event of a loss of coolant accident, caused by failure or

piping in the main coolant system. In NAPS, an improved ECCS, incorporating passive accumulators as well as pumps for long term recirculation core cooling has been incorporated. This system has been designed with adequate redundancy of components of proven reliability.

Calandria, End-Shield Assembly

The earlier arrangement of separate calandria and end shields suspended by support rods have been replaced by an integral arrangement supported directly by the reactor vault walls. This design simplifies the alignment requirements between calandria tubes and end shield lattice tubes and is more suited to conditions at a seismic site. The end shield design is further simplified by incorporating an arrangement of steel balls to be filled in the shields at reactor site, to replace the earlier shielding slab design. This reduces the weight of the component during transportation and also results in cost saving.

Water Filled Calandria Vault

The incorporation of the water filled vault housing the calandria enables elimination of the complex air and water cooled thermal shield system and the cooling coils embedded in concrete. This feature eliminates the production of radioactive Argon-41 which was being produced in the calandria vault and thermal shield cooling system of earlier reactors. Thus, the routine air-borne radioactive effluents from this station would be free of Argon-41

Layout Modifications for Ease of Maintenance

The light water auxiliary system has been shifted to outside the RB, thereby reducing the frequency of entry into RB and reducing maintenance radiation exposures. Separation of heavy water and light water areas within the RB has also been attempted, to facilitate heavy water vapour recovery. The heavy water recovery driers have also been located outside the RB for easier maintenance and improved availability.

Process Water System Ultimate Heat Sink

In the Rajasthan reactor, the process water as well as condenser cooling water reject the heat in an open loop to the lake. In the Madras reactors, the condenser cooling is done by an open loop using sea water, while process water system for cooling radioactive fluids is a closed loop ultimately rejecting heat to the sea, in the Narora reactors, however, condenser cooling water ultimately rejects heat to the atmosphere in natural draught cooling towers. The process water is again a closed loop and heat is rejected to atmosphere through induced draught cooling towers. The makeup water is supplied from the canal. The closed loop process water system eliminates possibility of active fluid coming to the canal even in case of heat exchanger tube failure.

Emergency Power Supply

The reliability of emergency power supply system in Narora, is increased by providing three diesel generating sets of higher capacity; only one number is adequate to supply to all safety related tools.

Waste Management

A Waste Management Plant of improved design has been set up at the NAPS Site for the treatment of liquid and solid wastes. The design provides for practically zero discharge effluents from the reactor plant.

Design Review

The design of the entire reactor plant is made as per the codes and guides of the AERB [Atomic Energy Regulatory Board] and the International Atomic Energy Agency. The design of all safety related systems and components are reviewed and cleared by the Design Safety Committees of the Regulatory Board.

All design data and information on all structures, systems and components are documented for records. The important design and analysis information is submitted to the Regulatory Board in the form of Safety Analysis Reports and other documents for obtaining authorisation for construction, commissioning and operation.

Commissioning

There has been major design modifications and improvements in many areas in the Narora plant. By and large, the commissioning so far has proceeded smoothly and on expected lines. Considering the newness of many designs, some unexpected problems were bound to crop up during the commissioning. The timely and effective manner in which these problems were sorted out is a tribute to the calibre of the scientists and engineers in NPC [National Productivity Council], BARC [Bhabha Atomic Research Center], AERB and many outside organisations who have been working untiringly towards the commissioning of NAPP. With the criticality of NAPP-I a very important milestone towards the 10,000 MWe nuclear power programme has been reached.

Doubts Over Safety

51500116 New Delhi PATRIOT in English
17 Mar 89 p 14

[Text] The Committee for a Sane Nuclear Policy has expressed distress that the Government had commissioned the Narora atomic power station despite doubts over its design and safety, reports UNI.

In a statement, in New Delhi committee convenor Dhirendra Sharma said the opinions expressed by the Faculty of the Indian Institutes of Technology, eminent citizens, writers and social thinkers about the plant had been ignored by the Government.

The committee urged the Government to stop the functioning of the plant and order its permanent closures.

"Problems of safety at Narora are linked with its design defects and poor quality of construction," he said.

Mr Sharma said that according to an official document, there were 30 per cent 'deformations' in its engineering value. But these were cleared by officials of the Department of Atomic Energy, one of whom had admitted that there were "deviations from the original specifications" in the construction of the plant.

The committee, Mr Sharma said, felt 'construction deviations' considered 'insignificant' by DAE had caused damage and outages leading to loss of power, heavy water leaks and injury to workers at the Madras and Rajasthan atomic power stations.

"Secrecy and non-accountability (in the management of nuclear facilities) have not permitted any public inquiry into the violations of procedures in the commissioning of the plants," he said.

Mr Sharma said the Narora plant was located on alluvial soil in a high seismic region, on the banks of the Ganga.

"The official claim to safety is based on secrecy enjoyed by the nuclear establishment and the Narora plant has shown signs of poor quality construction," he said.

Mr Sharma said 'control rods' used in the Narora plant were damaged during test operations and sub-standard pipes were found leaking. The plant's primary and secondary safety systems failed to perform according to its engineering specifications.

There were also reports of 'instability' experienced by the main structure housing 'calandria' which bears the uranium fuel rods.

Doubts Deemed Legitimate

51500116 Bombay THE TIMES OF INDIA in English
18 Mar 89 p 11

[Editorial: "Euphoria on Narora"]

[Text] The Atomic Energy Commission sounds very pleased with itself about the commissioning of its 235 MW Narora power plant. But this is somewhat unwarranted. To begin with, the Narora plant—and Kota and Kalpakkam before it—was expected to be a landmark in the indigenisation of the nuclear power industry. If this is so, it is odd that the government is going ahead with the import of two Soviet reactors of an entirely different technology for installation at Koodankulam in Tamil Nadu. This suggests that it is not willing to rely entirely on local know-how. What is more, going by the performance of the two earlier units, questions can legitimately be raised about the safety and reliability of this reactor.

One unit of the Kota plant has had to be decommissioned because of a crack in its end-shield. A unit in Kalpakkam has been shut down on numerous occasions for technical reasons, while another has of late faced problems due to a heavy water leak. Given this record, the AEC should have been a little more restrained in claiming that Narora is a triumph of Indian nuclear technology.

Although the objections to the location of a nuclear power plant in Narora may now be academic as the plant is a *fait accompli*, they need not be brushed under the carpet. The basic objection to this site is that it is located in a zone with significant seismic activity. The site selection committee, headed by the late Dr A.K. Ganguly, rejected it on these grounds. Even though the government chose to keep the report a secret, Dr Ganguly put his objections on record. It is disingenuous on the part of the AEC to declare now that the report did not reject the site but merely suggested an alternative. The Ganguly committee rejected Narora not just on the question of seismicity but because it has rich alluvial soil, requiring much deeper foundations than normal. If the AEC is convinced that it had adequate reason to overrule the Ganguly committee's objections, it should make the report public, along with justifications for rejecting it. This would demonstrate that the AEC has recognised the need for greater public accountability following Chernobyl. Such an explanation is all the more essential as the costs of Narora have more than doubled not only because of the eight-year delay in construction but also because it has had to accommodate additional safety features specifically required at this location. The country needs to be assured that the atomic energy regulatory board is exercising its watchdog role.

Report Reveals State of Nuclear Power Program
BK0705074689 Delhi Domestic Service in English
0730 GMT 7 May 89

[Text] The country's nuclear power generation has touched an all time high of 6,068 million units during last year. This represents a 14 percent increase over the preceding year, the highest ever recorded so far.

The annual report of the Department of Atomic Energy said the Hazira heavy water plant is expected to be completed by the end of the current year and will be commissioned next year.

It said the government's decision to set up 10 indigenous nuclear power reactors with a cumulative capacity of about 400 megawatts has given an impetus to the country's nuclear power program. In addition, an agreement was signed with the Soviet Union for construction of two units of pressurized water reactors of 1,000 megawatts each, the report said.

IRAQ

New Missile Project Said Nearing Completion
PM2704084689 London AL-SHARQ AL-AWSAT in Arabic 24 Apr 89 pp 1-2

[Alan George Report: "Exclusive AL-SHARQ AL-AWSAT Report: "Iraq About To Complete Project for Production of Missile With 1,000-km Range"]

[Excerpt] London, AL-SHARQ AL-AWSAT—With assistance from European companies, Iraq is about to complete a secret missile production project, named "DOT."

The project is believed to be connected with the development of warheads for the Condor-2 missile in cooperation with Argentina and Egypt.

The two-stage missile, which is propelled by solid fuel, has a range of 1,000 km, and weighs 500 kg, will succeed the Condor-1 which Argentina manufactured in late 1970's with assistance from the West German aerospace company Messerschmitt-Boelkow-Blohm (MBB).

As AL-SHARQ AL-AWSAT mentioned last month, the major role in the manufacture of Condor-2 was played by a group of Swiss companies headed by the Zug Company [Cutsin] in which former MBB engineers played key roles. [passage omitted]

Minister Denies Missile Industry Cooperation
JN2704211289 Baghdad INA in Arabic
1600 GMT 27 Apr 89

[Text] Baghdad, 27 April (INA)—Husayn Kamil, minister of industry and military industrialization, has denied that Iraq cooperated with any Arab or foreign country in the field of missile industries. Speaking at a news conference here today, Husayn Kamil said that Iraq is self-reliant in producing missiles. He added that Iraq continued its own efforts to produce and develop a new generation of long-range missiles.

Husayn Kamil said that Iraq has offered much of its military products as gifts to its Arab brothers and that they are now used in their armies. He added that nothing prevents any Arab country from purchasing Iraqi weapons since this action would enhance the march of integration and Arab solidarity.

The Iraqi industry and military industrialization minister said: We intend to set up a project for the warplanes industry and contacts are underway with France and the USSR in this respect.

He added: We have received positive signs from the two sides to implement the project.

Husayn Kamil added that Iraq has modernized the Soviet Ilyushin aircraft by making it an early warning aircraft after providing it with certain equipment, systems, and Iraqi requirements. The plane has become more developed and advanced in terms of efficiency than the British Nimrod aircraft.

He said that this aircraft is different from similar planes in the world because it is designed and produced in Iraq. The Iraqi minister affirmed that work continued to produce a new advanced generation in this respect.

The Iraqi minister added that several advanced weapons will be displayed in the Iraqi pavilion such as the self-propelled 155-mm gun, which is three times more efficient than its Austrian and Spanish counterparts. He added that the new Iraqi gun, the self-propelled 210-mm gun, is an advanced gun that is unique in the world in terms of its size, range, and barrel capacity. He noted that work continued to produce the 7-barreled 30-gun and another 57-gun to be used in the air defense.

Answering a question on the participation of the United States, the Iraqi minister said that the U.S. State Department prohibited military equipment and weapons producing companies from taking part in the fair with the exception of a civilian aircraft, Gulf Stream, and jeeps from General Motors. He affirmed that Iraq is not annoyed by this stand as the matter concerns the United States.

The Iraqi minister said he will soon announce the details of establishing a project for producing sedan cars and trucks. He said that many factories have been liberated and the opportunity has been given to civil industries to take part in military industry.

He affirmed that Iraq's objective of organizing the military industry fair is peace and to give an idea of the development reached in Iraq in the field of military industry.

He said: We do not develop, design, and produce weapons to create more wars. Our objective is to establish peace and give a message to others that Iraq has manpower, as well as material and military capability that qualify it to defend its sovereignty and security.

ISRAEL

MOSSAD Said Acting Against Arab Missile Systems

TA2804174289 Tel Aviv DAVAR in Hebrew
28 Apr 89 p 1

[“Exclusive” report from London by Dalya Sharon]

[Text] London—The Israeli Government has instructed the MOSSAD to act against the development of missile systems in Egypt and Iraq. This is reported by knowledgeable sources in London.

The explosion in the car of the director general of the Consen [as published] Company in the south of France last summer is part of this operation. The Consen Company has offices in Switzerland, Austria, and Monaco, and it is active under the cover of an administration company.

Company officials refuse to respond to questions about their role in the development of the Condor-2 missile, being jointly developed by Egypt and Argentina with Iraqi financing. One of the companies which has business links with Consen, “The Institute for Advanced Technology,” centered in Zug, Switzerland, was mentioned in U.S. court documents as the body through which \$1 million was transferred and used for the purchase of technological products whose export is banned by the United States.

Another company, centered in Salzburg, supplies “coordination services” as part of the Egyptian commitment to the project.

According to the London sources, the project engineers met in Salzburg last week to discuss the technical difficulties which the project has encountered lately. The type of fuel to be used for the second stage of the missile’s development has not yet been determined, and the date for the test launching in Argentina has been postponed time and again. The sources report that what is being planned is a missile with a range of 1,000 km.

The British sources are convinced that although the project is advancing slowly, and is lagging behind similar Israeli projects, the Condor will ultimately reach the experimental stage.

Since 1987 the United States has adopted a policy of restricting the sale and export of components which may be used in the production of missiles and guidance systems. This is delaying the Condor-2 project.

According to the London sources, Egyptian Defense Minister Abu Ghazalah was deposed because his name was raised in the context of technological smuggling in California. A U.S. citizen, who had been a childhood friend of the Egyptian minister, was caught and imprisoned for attempting to circumvent U.S. exports limitation laws.

Despite the fact that Abu Ghazalah was “shelved,” at least outwardly, Egypt is continuing to develop the project at Abu Za’bal, northeast of Cairo. It is estimated that the missile will not be ready for testing before 1992.

PAKISTAN

PRC Nuclear Plant Pact, Talks With USSR Noted

BK0605101489 Lahore JANG in Urdu 27 Apr 89 p 1

[Text] Islamabad (Special Report)—According to highly placed sources, the PRC will supply three nuclear power plants of 300 megawatts each to Pakistan. Details of necessary agreements in this regard were finalized during Prime Minister Ms Benazir Bhutto’s visit to China.

Under the agreement, installation work on all the three plants will begin in Pakistan before December. It has been learned that talks are also under way with Romania and France on the supply of 900-megawatt nuclear power plants.

Moreover, talks are also being held on a similar agreement with the Soviet Union. It is understood that the acquisition of nuclear power plants will be considered a great success for the present government. Installation of these power plants will end the energy crisis in the country.

Paper Says PRC To Sell Nuclear Power Plants
BK2704140089 Hong Kong AFP in English
1341 GMT 27 Apr 89

[Text] Karachi, Pakistan, April 27 (AFP)—Pakistan will buy three 300-megawatt nuclear power stations from China, a newspaper reported Thursday.

The Urdu-language daily JANG quoted informed sources as saying that an agreement was reached during Prime Minister Benazir Bhutto's visit to China in February. Installation will start by December, it said.

There was no official confirmation of the report.

The newspaper also said that Pakistan was negotiating with France, Romania and the Soviet Union to buy nine 900-megawatt nuclear power stations.

Minister Discusses Nuclear Cooperation With Turkey
NC0905074689 Istanbul HURRIYET in Turkish
4 May 89 p 17

[Aziz Utakan report: "Turkey Should Be Wary of the Axe of the Western World"]

[Excerpts] Ankara—Pakistani Minister of State for Defense Ghulam Sarwar Cheema, who is in Turkey to attend the defense industry exhibition, has made significant statements to HURRIYET on nuclear cooperation and defense industry links between Turkey and Pakistan.

Cheema said that Pakistan wants to develop cooperation among Turkey, Iran, and Pakistan in the defense industry domain. He noted that his country is prepared to cooperate, but Iran continues to maintain an uncertain policy. Asserting that Iran must clarify the policy it will pursue in the future, Cheema said: "The Iranians have been inviting me to visit their country for the past 4 months. I will visit Tehran in a week's time and ask the officials there 'whether they wish to fall into the lap of the Soviets.'" [passage omitted]

Replying to the questions asked him by HURRIYET on cooperation between Turkey and Pakistan in the nuclear field, Cheema asserted that this is a very sensitive matter. He said:

"Pakistan has paid a heavy penalty for this during the past few years. The country was handed over to a dictator for this reason only. The Western world in general, and the Americans in particular, directed pressure on Prime Minister Bhutto to have our project halted. This is a historic reality. They told us to stop manufacturing nuclear arms and Prime Minister Bhutto answered: It is common knowledge that my country needs to generate electricity. Our hydroelectric power plants are not enough. This is our only solution. Pakistan has neither oil nor coal reserves. We are compelled to develop nuclear power.

"But the Western countries were not satisfied with this. The Western world regarded even a single stone in the hands of the Islamic world as a threat against it." [passage omitted]

"No one has come to Turkey to tell similar things to Prime Minister Turgut Ozal so far. Nevertheless, Bhutto refused to agree to the Americans' suggestions. He paid the penalty for not yielding with his life. Consequently, my country has paid the cost of this courageous stand for 11 years."

Cheema said that regardless of what has happened in the past Pakistan has continued its nuclear work. He asserted: "We manufactured small reactors and built nuclear power plants. However, we have never considered this for military purposes. Peace always had priority. We are too small and too poor to take greater risks in that field. Nevertheless, we have the technology. It is a question of time. We have not adopted a political decision in that regard as yet."

Noting that the accumulated knowledge in one country should be shared by the other between Turkey and Pakistan, Cheema said:

"I am afraid that everyone knows what the other does in this world. We have suffered until now. The axe will be turned against Turkey in the future as well, and they will not bother to give any reason for it. You will find them confronting you right from the very beginning." [passage omitted]

Cheema noted that Pakistan has realized the importance of competing with the superpowers in every field. He added: "The Western countries have tried to prevent us from moving together and they will continue to do so in the future."

Arguing that the concept of individual independence is no longer valid in the world at the present time, Cheema said:

"Regardless of the strenuous effort made by the Christian world, fraternal relations between Turkey and Pakistan have increased. It is as if we have integrated to

become a single whole. We are not among the most wealthy countries. However, a glance at our resources will reveal that we have common security interests."

Cheema said that Iran, Turkey, and Pakistan must carry out joint work on matters concerning defense from the point of view of their interests. He stated:

"We started a project for manufacturing armored personnel vehicles in Pakistan. Unfortunately, Turkey has a similar project. If only one of the two countries were to realize this project, then the other could have allocated resources for a different project. This applies to Iran as well. You can manufacture the F-16 aircraft and sell them to us, we can manufacture armored personnel carriers, and Iran can invest in another project."

Noting that Pakistan is aware of the fact that realizing a number of projects within a short period of time was impossible, Cheema said: "But we have to achieve this. We shall undertake a joint venture in the defense industry domain prior to the end of 1989."

Cheema said that the Pakistani Administration cherishes warm and fraternal feelings toward Turkey. He asserted: "The affection felt by a Pakistani for a Turk is beyond the concept of the factors of time and space. God forbid, even if a ferocious regime comes to power in Pakistan, it will not be able to remove the affection that is felt for Turkey. No one can think of such a thing. Prime Minister Benazir Bhutto will be visiting Ankara (24-27 May). You will all see that she is very sensitive to Turkey. As a member of the Pakistani Government, I can say that we have two main friends in the world. One of them is Turkey and the other is the PRC. The rest come after these two countries."

UN Delegate on Nuclear Nonproliferation
BK1005084589 Islamabad Overseas Service in English
0800 GMT 10 May 89

[Text] At the United Nations, Pakistan has reiterated its commitment to nuclear nonproliferation and firm resolve to keep the region free from nuclear weapons.

The Pakistan delegate, Mr Mirza Javed Chauhan, told the Disarmament Commission that Pakistan does not possess nuclear weapons, nor does it have any intention to do so. It is prepared to accept any equitable and nondiscriminatory agreement that would permit the countries of the region not to acquire or pursue nuclear weapons.

He said in this regard Pakistan has proposed a conference on nuclear nonproliferation in South Asia under the auspices of the United Nations.

He called for establishing a mutually acceptable military equilibrium among the regional states keeping in view the capacity of each state for indigenous (?arms) production, acquisition from external sources, and the level of sophistication of arms.

Official on Efforts To Check Nuclear Weapons
BK0505161189 Islamabad Domestic Service in Urdu
1500 GMT 5 May 89

[Text] Pakistan has stressed the need for new efforts to check the spread of nuclear weapons and to devise a system to verify nuclear stockpiles and tests which allows no discrimination and is acceptable to all.

This was stated by Munir Ahmed Khan, chairman of the Pakistani Atomic Energy Commission, while addressing a symposium on science and world affairs in [name indistinct] today.

He said that primary responsibility for the control of nuclear weapons and tests lies with the big powers who should set the example in this regard so other countries may follow suit. He added that in view of the rapid development of science and technology, nuclear weapons technology cannot be restricted through the obsolete policies of restrictions.

Munir Ahmed called upon the international fraternity to help in taking steps to enhance mutual trust as has been done by Pakistan in proposing to set up a nuclear-free zone in the South Asian region.

UK Nuclear Inspector Visits Krasnoyarsk
PM0405105289 Moscow IZVESTIYA (Morning Edition) in Russian 1 May 89 p 1

[Interview with R. Ryder, chief inspector of the UK Nuclear Power Station Inspectorate, by own correspondent A. Pashkov in the course of visit to Beloyarsk nuclear power station: "British Specialists at the Beloyarsk Nuclear Power Station"; date of interview not given; first paragraph is IZVESTIYA introduction; for further reportage on the visit of the British Nuclear Inspection Team to the USSR, see the 2 May issue of the Soviet Union DAILY REPORT, p 36]

[Text] Sverdlovsk Oblast—A delegation from Britain, headed by R. Ryder, chief inspector of the UK nuclear power station inspectorate, has visited the Beloyarsk Nuclear Power Station.

[Pashkov] What is the purpose of your visit to the Urals?

[Ryder] There are various types of reactors in your country—this is rich practice that is worth studying. The Beloyarsk Nuclear Power Station is one of the biggest, here a fast breeder reactor (BN-600) has been in operation for 9 years, while in many countries (including ours) there are problems with the performance of a similar type of reactor. We would like to see how safety measures are implemented. We intend to continue cooperation in this sphere.

[Pashkov] Before coming to the Beloyarsk nuclear power station you must have had some ideas about it. How far did these ideas coincide with what you have seen, and how far, in your view, does the station's safety accord with world standards?

[Ryder] It is hard to answer that last question—the visit is too short. We will continue to look and study. As for the first impression: Talking with specialists and operating personnel, we realized that they have high qualifications and know what they want and how to get it. What we define to ourselves as the maintenance of the station, the operation of the systems, is at the proper level here. In my view it is still very expensive to begin the wide construction and operation of units of the BN-600 type, but here it is in operation, and experience is being accumulated. So the prerequisites are being created for increasing the economy without detriment to security. Your openness and unwillingness to conceal anything will certainly play a major role in the formation of a single worldwide pool of experience.

[Pashkov] What do you think, is the proximity of the Beloyarsk nuclear power station dangerous to the 1.5 million population of Sverdlovsk?

[Ryder] The distance in kilometers is normal: In Britain nuclear power stations are located in approximately the same way. But we try to ensure that as few people as possible live within a 50 km zone. The problem is not

one of distance, but of the level of guaranteed safety. But on the other hand there are very strict standards, and if the owners of the nuclear power station fail to fulfill them they are deprived of the right to operate the station. We are not involved with the problems of improving the qualifications of operating personnel, but every owner knows that if the wrong people work there, they will run into difficulties with our service, which is completely independent of the designers, builders, and operators. There are, I repeat, strict standards whose nonobservance automatically leads to economic and organizational sanctions.

[Pashkov] Do you collaborate with the public?

[Ryder] No decision to build a nuclear power station can be taken without a public referendum [as published].

[Pashkov] But you build many, so you must be able to convince people. How?

[Ryder] Mainly with the help of what you now call "glasnost." In Britain, we realized long ago that the less secrecy there is around a nuclear power station, the more confidence there is. A nuclear power station is a source of energy that it is hard for society to do without, and you have to tell people about this seriously and in detail, share with them the problems of ensuring safety, show them as widely as possible how the stations work. Any English person, even for mere curiosity, can visit a station, where he will be shown everything and have everything explained. After all, people are afraid of what they do not know and do not understand. In our view an international legal system should be formulated to govern the relationship between people and nuclear power stations. Incidentally, our visit here promotes this to some extent.

Kiev News Conference Assesses Chernobyl Situation

LD2604161489 Moscow Domestic Service in Russian 0330 GMT 26 Apr 89

[Text] It is exactly 3 years today since the accident at the Chernobyl nuclear power station. On the eve of this occasion a news conference was held in Kiev, called "Chernobyl—3 Years After the Accident." One of those taking part was our correspondent for the Ukraine, Vladimir Sokolov. He will tell us about it:

[Sokolov] The news conference was held by the standing extraordinary commission at the government of the republic, with the participation of scientists and specialists. The elimination of the consequences of the accident is continuing, and will go on for a long time yet, under a program elaborated by the extraordinary commission up to the year 2000. But over the last 3 years only the main things have been done. Dozens of villages have been built for those inhabitants evacuated from the 30 km zone, as has the town of Slavutich, in exchange for Pripyat which was abandoned by the staff of the station.

Essential protective measures are being carried out in the areas of radiation fallout on the territory of the republic, of which detailed maps have been published by the Ukrainian press. The prime concern is, of course, for people's health, especially that of those evacuated from the danger zone, as we are told by the head of the extraordinary commission, Kachalovskiy, first deputy chairman of the republican Council of Ministers:

[Begin Kachalovskiy recording] Two hundred and sixty thousand people have been examined. Sixty-two percent have been found to be healthy, and 38 percent of the population have been treated at out-patient departments, hospitals and sanatoria. A rise in illnesses and congenital anomalies has not been observed. [end recording]

[Sokolov] And for those living in radiation polluted zones, the national Ministry of Health recently established a new maximum level of irradiation of 35 rem for 70 years of life. In order to adhere to this maximum level, it is essential, as has been established, to move the inhabitants of several more centers, including five villages in Kiev and Zhitomir oblasts, on a priority basis. In a further 73 population centers, where consumption of local products is restricted, uncontaminated products are being brought in, for which each inhabitant receives an additional payment of R30 per month. And everywhere in areas where foodstuffs are produced and processed, and also at 156 markets and shops where they are sold, strict monitoring of their quality has been set up. As concerns the approximately 1,000 people who have returned without authorization to villages in the 30 km zone, a decision has been taken to permit residence to people of over 50 in the relatively favorable of them—and there are plenty of such villages there—and to resettle the rest, while children and their mothers have been removed without delay. Is there any possibility of further radiation being transferred from the Chernobyl zone? President of the Ukrainian Academy of Sciences Paton provided information on the wide-ranging examination of such possibilities, by way of dust, by being washed into rivers or by way of underground waters, which had, all in all, yielded negative results, and he concluded:

[Begin Paton recording] We thus do not foresee any serious dangers for the republic as a whole at present. [end recording]

[Sokolov] He also spoke about the introduction of wide utilization of radiometers for monitoring the radiation situation. One type of such an instrument is already being produced in Kiev, but these precise instruments are extremely expensive and hardly accessible to the population. Moreover, they will require a special service for controlling them. It is clearly more sensible to create in all places state radiometric centers for general information. And what about the Chernobyl station itself? Its director, Umanets, reported that over the 3 years the functioning power sets had generated 4 million kwh of

electricity, and that the sarcophagus over the stricken reactor of the fourth set is not giving any cause for concern but continues to be monitored by scientists. The fate of the station itself, whose resources are calculated at 30 years, will be decided after an experiment involving the replacement of old power sets by improved ones—as is laid down, within 15 years of operation—at the Leningrad nuclear electric power station, says Umanets:

[Begin Umanets recording] If the game isn't worth the candle, then you can consider that we'll start closing down the first set and so on in 3 years' time. If the results of the reconstruction are assessed as positive, the first set will be closed down in the region of the year 2007. [end recording]

40,000 Mark Chernobyl Anniversary, Urge Ban
LD2704172289 Moscow TASS in English
1648 GMT 27 Apr 89

[Text] Kiev April 27 TASS—Forty thousand participants in a meeting took place in the capital of the Ukraine Wednesday night honoured by a minute of silence the memory of the victims of the Chernobyl accident.

The meeting was organised on the initiative of the Ukrainian "Zeleniy Mir" association, which functions at the republican peace committee, in connection with the third anniversary of the accident at the Chernobyl nuclear power station.

"I shall never forget my comrades who were fighting fire side by side with me and gave their lives to prevent the disaster from assuming a still more terrible scope. I know that memories about them are living in the hearts of all people of our country", Leonid Telyatnikov, lieutenant-colonel of the fire-fighting service of the Soviet interior forces, said in a speech at the meeting. On April 26, 1986, he was one of the first to begin to fight the fire that blazed out at the station.

"The Chernobyl accident was the outcome of a chain of erroneous decisions and actions of scientists, designers, and the attending personnel", said Vladimir Shcherbina, the station's deputy chief engineer.

"But nuclear power engineering can be safe. Our collective while providing the republic with electric power at the same time engages in clean-up operations so that not a single contaminated area would remain in the Ukraine".

The participants in the meeting urged the Ukraine Council of Ministers to raise before the country's government the question of the inadvisability of the operation of the Chernobyl nuclear power station and termination of putting into operation of new power generating sets at operating stations.

They called for making the 30 km zone around the Chernobyl nuclear power station an international research ground. Speakers mentioned the need to raise before the republican Supreme Soviet the question of holding a referendum regarding further development of nuclear power engineering on the territory of the Ukraine.

International Seminar on Chernobyl Ends in Kiev
LD2804164589 Moscow TASS in English
1538 GMT 28 Apr 89

[Text] Kiev April 28 TASS—By TASS correspondent Aleksey Petrunya:

Participants in an international seminar, European Chernobyl, which came to a close in the Ukrainian capital Kiev today agreed to promote cooperation in the study of sources of enhanced danger to living organisms and ecological systems.

Leading scientists, experts and public figures from 17 European countries, the United States and Canada discussed for four days scientific arguments against any way on the continent that is covered with atomic power plants, chemical enterprises and other hazardous production facilities.

The seminar launched one of the biggest projects slated by the World Peace Council (WPC) for 1989, "Eurochernobyl", which is sponsored by the Ukrainian Peace Committee. "Our meeting was marked by frank discussion on topical problems of concern to all of mankind," said Robert Prince, secretary of the World Peace Council.

"Despite differences on particular issues, we were unanimous in what concerns the principal thing—the aspiration to prevent any armed conflict which, given the existence of so many atomic power plants, will inevitably lead to nuclear disaster," he said.

Now that the seminar is over, Prince remarked, one should start practical work. The direction of this work will largely determine the well-being of the civilisation.

Speakers at the seminar stressed the need to popularise the results of research work and provide them to authoritative international organisations and governments.

Participants in the seminar observed that advancement in implementing the Eurochernobyl project and the accumulation of scientifically substantiated data will help bring about the conclusion of an agreement in Vienna at the talks on reducing conventional arms.

"I think that this meeting is only the start of a new stage in assessing the Chernobyl tragedy," said Yuriy Shcherbak, a deputy to the new People's Congress of the USSR and chairman of the Ukrainian Ecological Association Green World.

"It is perfectly clear today that the entire civilised world rejects the possibility of any warfare in Europe. That is why the peace movement has acquired worldwide dimensions."

The seminar's participants were received at the Presidium of the Ukraine's Supreme Soviet, visited the Chernobyl nuclear power plant and met with representatives of the Kiev public.

Power Ministry Bans News of AES Accidents
PM2804132589 Moscow IZVESTIYA (Morning Edition) in Russian 26 Apr 89 p 6

[Report by IZVESTIYA special correspondents N. Baklanov and A. Illeash, incorporating a number of interviews with officials: "At the Station, in the Zone, and Nearby. A Few Interviews 3 Years on From the Chernobyl Tragedy"; dates and places of interviews not given]

[Text] Chernobyl, Kiev, Moscow—Around 116,000 people evacuated from the affected area, R8 billion in direct damage.... Loss of human life, which is immeasurable, and undermined faith in the nuclear power industry—this is just the "upper," visible layer of the problems raised with the utmost acuteness by the tragedy which occurred 26 April 1986. Unfortunately, even today it is too early to speak of total glasnost in the sphere of the nuclear power industry and the consequences of the accident. Leading specialists—physicists, medics, and radiologists—confirmed this. However, glasnost is gaining ground, albeit with difficulty, in the realm of departmental secrecy.

The departments themselves have drawn lessons from what has happened. It is difficult now to take a single step without taking account of public opinion. Each new plan to construct a station, indeed the very existence of nuclear electric power stations [AES's] is now questioned by the people living nearby. And today it is no longer possible to ignore these feelings. Progressive scientists and specialists are seeking contact with the public, but so far without particular success. Nonetheless, many decisions and the very development prospects of the nuclear power industry have now been reviewed, and the press and the population have played a certain role in this.

We have already reported on the new practice of submitting new projects and the country's existing AES's to international expert evaluation (which, incidentally, is not cheap). Following such an expert evaluation, it was decided to close down the Armenian AES. Other important decisions have been taken—it is planned to decommission the No 2 units at the Voronezh and Beloyarsk AES's, and the No 1 unit at the Novovoronezh AES has been shut down. Construction of the No 3 unit at the Ignalina AES has been suspended. And the construction of the Odessa and Minsk nuclear heat and electric power stations has been completely stopped.... But these are, so to speak, surgical interventions. The government has

also adopted preventive measures—a new statute regarding the siting and location of power stations has been adopted and much has been done to enhance the safety of existing stations....

However, to rest content with what has been achieved would be to ignore one of the main lessons of the tragedy. Only if there is total glasnost and public monitoring will it be possible to rule out a repetition of the past. This has to be remembered by everyone who is in any way connected with the nuclear power industry.

...Even 3 years on, IZVESTIYA's mailbag is full of questions connected with Chernobyl. All sorts of questions—questions directly connected with the consequences of the tragedy and people's health, and questions about how we can "get along" with the reactor units, of which there are now more than 40. We put some of these questions to specialists.

Ye. Kachalovskiy, first deputy chairman of the Ukrainian Soviet Socialist Republic [SSR] Council of Ministers:

You are quite right. One of the main problems is that there is still a shortage of reliable information. And the information that is available, is, alas, frequently distorted. Therefore I will briefly recall what has been done so far. Over the past 3 years the Ukraine has spent R2 billion on social needs alone. Back in 1986 7,500 houses and 500 apartments were built for evacuees in rural areas. In addition, 8,500 apartments were made available for evacuees in Kiev and Chernigov. In areas where evacuees have settled, 693 sociocultural amenities have been built. Gas has been supplied to thousands of houses and apartments. A thousand kilometers of roads have been built or surfaced. Some 350 Artesian wells have been sunk and produce water now.

[Correspondents] People are very concerned that food should be free from contamination....

[Kachalovskiy] I agree. Therefore "clean" products are delivered to 73 population centers in the republic where the consumption of local products (especially milk) is restricted. Supplements (R30 per month) are paid so that people can buy these products. In the same areas three free meals per day are provided for children in schools and children's preschool establishments. A wage supplement has been introduced in 137 population centers where people are working in contaminated areas. Contamination charts have been compiled. And people's wages are worked out depending on where they work.

[Correspondents] Earlier there was resettlement of people. Today we are talking about resettlement of entire villages. What is it, and what are the reasons for it?

[Kachalovskiy] Inhabitants have to be moved out from another 12 villages. This is necessitated by new safety criteria. There are internal problems here, too—some people want to go and live near relatives in the new places, others want to live near their old neighbors....

[Correspondents] Who is currently living in the zone?

[Kachalovskiy] "Self-settlers." There are no more children; they have been sent away. But there are around 1,000 adults. Many, especially the aged, do not want to be resettled at any price. "Shoot us if you like, we will not go!" It is now planned to exclude from the territory of the "zone" some of the localities where the "self-settlers" are living and where the radiation situation is indeed normal—to create an "isoline" ["izoliniya"]. This has already been done in the southwest. Strictly speaking, there will no longer be a 30-km zone....

Yu. Spizhenko, Ukrainian SSR deputy health minister:

Of the 260,000 people examined in clinics, 62 percent were deemed healthy. No increase in radiation-produced oncohaematological diseases and congenital defects has been noted among the population. Those who needed treatment (38 percent of those examined) were given the necessary help as outpatients, as inpatients, and in sanatoriums. However, a person's health is determined, of course, not only by an absence of tumors. The accident affected a large number of people by depriving them of their sense of psychological and social comfort. This also has a direct bearing on health.

M. Umanets, director of the Chernobyl AES:

We now employ fundamentally new approaches in the operation of the AES. Whereas before staff who shut down a power unit were regarded almost as blameworthy, now we demand: If there is the slightest doubt or uncertainty, shut the unit down immediately! Then we will all investigate what is wrong together....

[Correspondents] How do you, as operational staff, rate the qualities of the RBMK-1000 unit? After all, that was the type that exploded at Chernobyl, and others of that design are still in use at Chernobyl...

[Umanets] Work has been done at the station to eliminate the design faults of the RBMK-1000. It is true that reactors of that design were one cause of the tragedy. But the similar fifth and sixth power units which were under construction until recently will not be commissioned. This is a new decision, a recent one. I make no secret of the fact that I used to think differently, but I have changed my view in the light of public opinion, which cannot be ignored now. I am convinced that we should seek not the abandonment of nuclear power but improved safety and environment-friendliness at nuclear power stations. And this must be done under the control of independent public and international expert evaluations.

[Correspondents] When, in your view, will it be possible to say that the consequences of the accident have been completely eliminated?

[Umantsev] Not for some time: Not in 50 years, not even in 100 years—let there be no illusions on that score. After all, some radioactive elements have a half-life of 100 years or even considerably longer.

[Correspondents] What can you tell us about the Chernobyl AES's development prospects?

[Umanets] They have still not been settled. The station could go on working to the end of its lifespan—30 years. But in that case the RBMK reactor units will need a major overhaul in 15 years. This year a partial overhaul is planned for the No 1 unit at the Leningrad AES. That work will show whether it is worth the effort. If it is, it means that the No 1 unit will be producing power until the year 2007. But if the economic and labor costs and so on cannot be recouped, we shall start to close it down in 3 years. The opinion of the majority of the station's collective is that, as RBMK reactors go out of service, they should be replaced by new-generation power units.

[Correspondents] Is there still a danger that the radiation may spread beyond the zone?

B. Paton, president of the Ukrainian Academy of Sciences:

Research has shown that more than one-half of the radioactive substances released into the atmosphere as a result of the accident fell to earth and were concentrated within the 30 km zone. The bulk of them is at a depth of 1-5 cm. The possibility of the spread of pollution has been carefully studied. During decontamination, dust suppression techniques were used to minimize the possibility of the spread of airborne radiation. Vertical movement of radionuclides in the soil is not expected to occur. The only real way for them to spread is by being washed out. But the "potency" of the "pollutant" entering reservoirs is so small (tens or hundreds of times lower than the maximum permissible level) that there is no question of any danger. [Paton ends]

One final point. The editorial office received a document when the report devoted to the 3d anniversary of the Chernobyl tragedy was already prepared for printing. But we still decided to publish extracts from the order by A. Mayorets, USSR minister of power and electrification, because it deals with a matter of principle—glasnost. The new document speaks of information not for publication in the open press or for broadcast on radio and television.

Just what bans has the department imposed? When it comes to the nuclear and "conventional" power industry the things none of us may know about include information on accidents and fires at power industry facilities

and construction projects belonging to the USSR Ministry of Power and Electrification, and the malfunctioning of basic equipment which caused material damage, casualties, and even less than catastrophic environmental pollution. The sector now also imposes a public ban on reporting on serious injury....

And to prevent official secrets from finding their way into the press the following point has now been adopted: "To ensure monitoring to prevent the publication of the aforementioned information in unclassified [otkrytyy] official documents and telegraphic correspondence and in materials intended for publication in the general press and for transmission abroad."

Is any commentary needed? Instead of commenting, we ask: How much longer are departments committed to maintaining their own secrets going to set the limits of glasnost, and in that case what is going to become of the 19th party conference's resolution on glasnost? And one more question: How are we going to do away with those areas of life which are exempt from criticism?

Public Questions Safety of Zaporozhskaya AES
18220109 Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 May 89 p 3

[Article by V. Sandul, engineer, Nikopol: "Zealously Protected"]

[Text] Not so long ago Nikopol residents discovered in their mailboxes a "Reminder to the population...." in the event of an accident at the Zaporozhskaya AES [nuclear electric power station]. Just the reminder itself makes one lose confidence in the promise of accident-free operation of the AES, and the question arises: Where are we going with the program for "AES-ization" of the country? And if one also takes into account the admission of Minister of Atomic Power N. Lukonin concerning the poor quality of AES equipment and the frequent shutdowns of reactors, which he made at a meeting of the permanent commission of the USSR Supreme Soviet, one feels like taking the map and looking to see if there are any places left in the USSR where one can live without being a hostage of the Ministry of Atomic Power.

The atomic energy station located 10-15 kilometers from Nikopol is called Zaporozhskaya. Nearby are the cities of Marganets, Ordzhonikidze, Energodar, Kamenka-Dnepranskaya, and other population points where about a million people live. The significance of the Nikopol-Marganets basin for the country is known, not to mention the two plants of unionwide significance in Nikopol (has anyone ever made a comparison of the cost of the station and the harm that would be caused by evacuation of the population points and the enterprises?)

But how did they begin to construct the Zaporozhskaya AES?

In the beginning on the left bank of the Kakhovka water reservoir there appeared a thermal electric power station [TES], and then, confirming the rumors (try not to believe them), an atomic energy station as well. It turns out that the same pattern can be observed in other regions—probably to keep the public calm. Therefore the arguments that an AES is considerably cleaner than a TES is not for us, and one can only guess how much fallout of products of fuel combustion and moisture from the AES cooling ponds there will be and where it will fall.

For a certain amount of time we could not understand why the delegate to the 19th party Conference, B. Oleynik, stopped mentioning the Zaporozhskaya AES (the texts of his speeches printed in the newspaper differ from those read over television and radio). It turns out that the director of the Zaporozhskaya AES, also a delegate to the party conference, somehow managed to persuade him to stop mentioning his station. One must assume that there was a reason for these actions, and he did not want to notify the entire country of the pollution of the Kakhovka water reservoir.

Incidentally, we still do not know what happened to the appeal of the Ukrainian SSR [Soviet Socialist Republic] scientific-technical and creative intelligentsia, "On revising the program for the development of atomic energy in the Ukraine," which B. Oleynik brought up for consideration at the 19th party conference. So it would seem that there was something for the director to avoid when he resorted to the device of silence to protect departmental secrets. For the Zaporozhskaya AES is located in our region in the most irresponsible and thoughtless way. Another use was found for the long-suffering Kakhovka water reservoir with its water polluted by industry, agriculture, and domestic wastes.

And they ignored even the requirements of departmental normatives ("Guidelines for Radiation Safety," "Recommendations of the International Commission on Radiation Protection") where it says: "When selecting a location for a research reactor and AES, it is first of all necessary to take into account sanitary and technical requirements which will provide for warning of harmful effects from the AES on the surrounding space and the local population. It is necessary to select a sparsely populated location with deep ground waters as a site for the construction of an AES."

Is it true that in our case the AES only consumes water? The cooling ponds with their sandy bottoms and dams prevent discharge into the water reservoir? And evaporation from the surface of the pond or cooling towers? Where do the blowdown waters go? How do the ground waters flow in the vicinity of the AES, toward it or away from it?

But clarity concerning the pollution of the water reservoir with radionuclides was finally provided by the head engineer of the Zaporozhskaya AES, T. Plokiy, and the chief of the department of safety and reliability, V.

Artemchuk, who in a discussion with L. Taranenko (*LITERATURNAYA UKRAINA* of 6 October 1988) noted as a positive phenomenon the accumulation of radiation by the fish since they can be...caught and buried and thus the radiation in the reservoir can be reduced (?!). This is indeed the time simply to throw up one's hands.

But we should like to obtain answers to a number of questions. Is it possible to eat the fish from the pond and if not, when will we begin to bury them? Is it possible to drink the water without special purification devices that remove the radionuclides? If so, for how long? How many atomic reactors will be constructed? Questions without answers. So we have to feed on rumors.

Ukrainian SSR Minister of Health A. Romanenko writes in one of his articles: "To our great sorrow we cannot dispel the rumors or the feeling of alarm on the part of the population or even a certain mistrust of us, the medical experts." But what do they expect if the population is only allowed to read "reminders"?

Representatives of the Ministry of Atomic Power and the directors of the atomic energy station will not descend to hold meetings with the community of the city. Representatives of the Ministry of Land Reclamation and Water Resources and the Ministry of Health make superficial, generally reassuring statements. But after what happened in Chernobyl this is not enough. We have already become convinced that zealous protection of departmental secrets leads to large problems. We all want to work peacefully, raise healthy children, and not be hostages of departments that demand the diversion of rivers, that transform nature, and create man-made seas which are subsequently to be used for cooling reactors.

**Chairman of Nuclear Safety Committee
Interviewed**

PM0905110189 Moscow IZVESTIYA (Morning Edition) in Russian 6 May 89 p 2

[Interview with V.M. Malyshev, chairman of the USSR State Committee for the Supervision of Safe Working Practices in the Atomic Power Industry, by correspondent A. Illesh: "Nuclear Electric Power Stations Without Secrets"; date and place of interview not given]

[Text] In the unabating polemic between the opponents and supporters of the development of nuclear power engineering, opinions have recently been frequently voiced regarding the need to give the public objective information about the state of nuclear power stations. *IZVESTIYA* has devoted many items to the problem of "secrecy" and the departmental instructions which restrict our knowledge of nuclear electric power stations [AES's]. It seems that openness here would also have positive influence on people's attitude toward the development of nuclear power engineering.

[Illesh] Vadim Mikhaylovich, I can understand the position of the ministries and departments which do not want to make public their imperfections, but why does a supervisory organ not provide this information? Especially because in the press you have also expressed yourself unambiguously in favor of glasnost in safety matters. That means that there is still some secrecy, is that not so?—that was the question which opened our correspondent's talk with V.M. Malyshev, chairman of the State Committee for the Supervision of Safe Working Practices in the Atomic Power Industry.

[Malyshev] First, I confirm my position: There should be glasnost. If nuclear power stations are constructed to increase people's well-being, then there is nothing to hide from people! According to our information, the ministries taking part in the development of nuclear power engineering are beginning to publish information on the work of nuclear power stations. The relevant information and assessment of various questions of safety by the state supervisory organ will also be published by our committee.

[Illesh] This can be called a step of openness and glasnost. Yet nonetheless so far people are only talking about it. But tell me: Could you provide information right now about the work of our AES's?

[Malyshev] Certainly. For instance, in March this year 44 power units were commissioned and there were eight unplanned stoppages of power units. There were no violations of safety requirements.

[Illesh] But are you not worried that the information of which kind which is constantly published could give rise to a negative reaction?

[Malyshev] No, I am not worried. First, you must tell any truth as it is. The degree to which society is prepared to accept it is another matter—here, I shall be frank, we still have work to do so that people understand this information correctly and draw normal conclusions from it.

For instance, how to understand the eight unplanned stoppages at AES's in 1 month? Is that a lot or not? In annual terms that is approximately two stoppages a year per power unit. In the developed capitalist countries which use nuclear power that indicator is between two and four. Incidentally, 3 years ago this figure in our country was between five and six stoppages a year but now there is in our view a steady trend toward its reduction. Approximately one-fourth to one-third of all unplanned stoppages occur through the fault of personnel both in our country and "over there."

I want to clear up one further point. Unplanned stoppages while naturally undesirable, are nonetheless a routine situation and come within the concept of normal operation on condition, of course, that the limits and conditions of safe operation have not been violated.

[Illesh] IZVESTIYA has often written of the stormy discussions of problems of nuclear power in the places where it is planned to construct AES's. What is your attitude toward the public opinion poll?

[Malyshev] Positive. But on condition that those taking part in the poll have a clear idea of the essence of the matters and are able to assess the consequences.

Today, in my view, the public opinion poll will not reflect an objective assessment of nuclear power. After all, at present it is emotions and by no means sober calculation or knowledge which dominate the basis of people's attitude toward it. Look at the paradox! Take 100 people on the street, in the movie theater, at a stadium or enterprise, and ask them: Who is in favor of banning, for instance, private transport? I guarantee you will only find a few who are in favor. Ask: Who is in favor of banning nuclear power? I am sure that considerably more than half will be. Well, let's stop all nuclear power. People can imagine what abandoning private transport would mean. But the majority do not know that each of us is over 100 times more likely to die under the wheels of an automobile than from nuclear power.

And almost all of them are unaware that to renounce nuclear energy would delay for a long time the solution of food and industrial supplies for the population and would increase the growth of disease and death from the deterioration of the ecology.

[Illesh] Good, that is the position of people with little knowledge. But why do some scientists, economists, and writers suggest closing the barrier to AES's?

[Malyshev] I think that today it is easy to become popular by eloquently criticizing nuclear power and knowing that you will not have to answer for it. Debate is possible and necessary. But actions are also necessary.

I am sure that in the situation which has taken shape we must instruct a group of scientists and economists (who do not accept AES's), having relieved them of other duties, to carry out an analysis of the country's economic development under conditions where there would be no nuclear power. To carry out the work the relevant institutes should be subordinated to them for the duration.

Then these scientists would know that our people's fate will depend on their conclusions and objective results. They will understand the epithets with which their names will go down in the annals of history. And on the basis of the results obtained return yet again to the solution of the problem of whether or not there is to be nuclear power in the USSR.

Our committee, called on to defend people's right to a safe life in favorable ecological conditions, is also interested in an unbiased, objective assessment of the pluses

and minuses of nuclear power, while not accepting that "pluses" for some people may result in "minuses" for others. If we decide to do something, it should be for the benefit of all.

And now we offer readers the first summary of events which have taken place in nuclear power engineering over the past month. The editorial office intends to publish these figures constantly.

In April this year there were 44 power units in operations and there were 9 unplanned stoppages of power units, including one at the Rovno AES, two at the Kola AES, one at the Chernobyl AES, one at the Khmelnitskiy AES, and four at the Balakovo AES. They included six caused by personnel, two because of the breakdown of equipment, and one because of the imperfection of planning solutions. There were no violations of safety requirements. The indicators for the radiation situation at the AES's and in the monitored zones remain unchanged and do not exceed the set norms. There were no cases of the overirradiation of personnel.

Rally Protests Tatar Nuclear Plant Construction
*PM2604152789 Moscow SOVETSKAYA ROSSIYA
(Single Edition) in Russian 26 Apr 89 p 3*

[Report by free-lance correspondent V. Danilov: "Initial Reactions: Danger Nearby"]

[Text] Hundreds of Nizhnekamsk inhabitants spent more than 2 hours at their first authorized rally. What was it that brought people to the square in front of Technology House? The construction of a nuclear power station 33 km from the city. It is estimated that the Tatar Nuclear Electric Power Station [AES] will be the biggest in the country. It is being constructed on the picturesque bank of the Kama, in a densely populated and rapidly developing industrial region. SOVETSKAYA ROSSIYA has already written about preventing construction of an AES on the Volga and its major tributaries ("Half of the Truth," 12 March 1989). Scientists in the autonomous republic regard the choice of site for the construction of the Tatar AES as extremely unfortunate. The biggest petrochemical and tire production associations in the country operate in Nizhnekamsk. Nearby, in Naberezhnyy Chelny, you have the giant Kama Truck Plant, and a major mineral fertilizers plant is starting up in Mendeleyevsk. Construction of a complex of motor vehicle enterprises has started in Yelabuga.... More than 1 million people live in these cities, which are situated close to one another, and they will soon find themselves between two AES's, because the Bashkir AES is also being constructed 100 km from there. It turns out also that there is a major underground fault near the Tatar AES. The people of Tatarstan were particularly alarmed by a force 6 earthquake, centered on Yelabuga, which occurred 17 April this year.

Tatar Nuclear Plant Being Built in Seismic Zone
PM1505140789 Moscow KOMSOMOLSKAYA PRAVDA in Russian 12 May 89 p 2

[Article by own correspondent A. Pankratov under the rubric "We Report the Details": "No Casualties, No Devastation, No Clarity....' Epilogue to the Earthquake in Tatarstan"]

[Text] Tatar Autonomous Soviet Socialist Republic [ASSR]—On 17 April many inhabitants of Mendeleyevsk, Naberezhnye Chelny, Yelabuga, Nizhnekamsk, and other cities and settlements in this densely populated industrial region of the Tatar ASSR unexpectedly awoke earlier than usual—at 0522 in the morning. The small "poltergeist," dropping crystal vases and china, overturning buckets full of water, showering plaster, and causing panes of glass to ring, possibly frightened them less than the vague rumble which continued for about half a minute and sounded like the noise of a K-700 tractor passing by on the other side of the wall. In one house in a small village near Menzelinsk, an old stove split and, in a settlement close to Mendeleyevsk, an absolutely sober peasant was knocked off his feet.

However, the local population learned of this terrible happening in the center of the ancient East European (Russian) plateau from the newspaper SOVETSKAYA TATARIA only on the 3d day. And the republic's television and radio failed to broadcast incoming information, giving as their explanation a ban on such information by civil defense bodies. This, despite the fact that on the very 1st day newspaper editorial offices and the Kazan State University had their telephones rung off the hook with questions: What has happened? What caused it? Will it happen again? And, the main question: Where are such powerful earth tremors coming from in the Russian plateau, which is considered to be safe? Your correspondent has also joined the investigation.

"Investigation?" The reader will be surprised. Why should there be an investigation? All you have to do is apply to the official seismic service, get accurate information from the instruments, and.... But the whole point is that there is no such service in the Tatar ASSR. That is precisely why the recent earthquake, whose epicenter was in the region of the city of Mendeleyevsk, has given rise to so many rumors (even going as far as speculation on a possible nuclear explosion). At the epicenter the tremors reached force of 5-6.

...In front of me lies an amateur chart plotting the Tatar earthquake; it was compiled by I. Iskhakov, the chief of Experimental Method Seismology Group No 50 of the "Tatneftegeofizika" Association. It was compiled a week after the earth tremor on the basis of public opinion polls and is still being formulated. In this we should say thank you to Irshat Akhmedovich, because the group, set up 4 years ago, is certainly not supposed to engage in this kind of large-scale seismic research. Its job is to monitor the tectonic situation in the region of the once very rich

Romashkinskiy oil field. It is armed with just four seismic stations of the "tortoise" type (two of them were out of action in preparation for the summer season when the earthquake struck).

"It was an ordinary tectonic earthquake," I. Iskhakov said. "They have occurred on the Russian plateau before, but they have become more frequent lately. Strictly speaking, that is why our group was originally set up. It is possibly only a coincidence, but we have established a link between the increase in oil drilling operations and the increase in minor earthquakes which can only be registered by special equipment. We have recorded several cases of oil well shafts breaking up and dozens of cases of columns collapsing. There are various explanations for this, but I believe that the tectonics of the region are to blame.... Of course, there is not really any reason to say that the earthquakes are technogenic, but active oil drilling operations could perfectly well serve as a kind of 'trigger mechanism' for the subterranean elements."

Unfortunately, the shortage of equipment and the narrow specificity of the task which Iskhakov's group has been set by the Ministry of the Petroleum Industry—to establish how to exploit the waning oil reserves for a little longer—make it impossible to shed any real light on the picture of the geological processes which are taking place here. But this light is not simply necessary—it is vitally important.

The giant Kama truck plant, the Yelabuga truck plant under construction, the mineral fertilizers plant in Mendeleyevsk, the major complex of petrochemical plants, the large oil drilling operations, the concentration of major pipelines, the two hydroelectric power stations with reservoirs at Kuybyshev and Nizhnekamsk, and, finally, the Tatar and Bashkir nuclear electric power stations [AES] being built about 100 km apart from each other make this region simply a giant powder keg from the viewpoint of seismic danger. I suspect that someone immediately after this comparison will accuse me of exaggeration at least. And officially speaking they will be right, unfortunately. That is because according to the charts showing the earthquake regions of the USSR which serve as the basis for planning all the most important national economic projects, the zone of the so-called Tatar anticline is classed as safe—resistant to a force 5!! Is there any point wasting my ink in that case?

"You know," geophysicist I. Iskhakov replied, "the Gazli region was also at first thought to be seismically safe, and it was once claimed that no major earthquakes were predicted on the young North American plateau. But everything turned out differently. And who today after Armenia can say anything categorically?"

Nevertheless? One of few, perhaps the only, specialist in the Tatar ASSR who is studying this matter is Professor Boris Burov, head of the geology department at the USSR Kazan State University. We will refer to him. But first of all:

Historical Background Information

According to far from full historical evidence, there have been earthquakes in the region of the Tatar anticline before (even just outside Kazan itself in 1866 and 1909). The strongest (force 5-6) occurred near Kozmodemyansk in 1807. In 1851 Yelabuga experienced earth tremors measuring force 4-5, and in 1914 there was a perceptible earthquake in the south of the Tatar ASSR.

In 1982 there was a series of earthquakes measuring force 3-4 near Almetyevsk. Four years later there was another earthquake, force 5-6, close by. In September last year another earthquake was registered to the north of Almetyevsk. And in January this year the instruments registered force 4-5 to the west of this city.

According to Professor Burov, in just over the last 100 years the Tatar anticline has experienced approximately 30 earthquakes stronger than force 4.

"The Kama fault runs right through this region," Boris Vladimirovich said. "About 10 million years ago the Kama River burst through to the Volga as a result of this fault becoming active. Active tectonic processes are still continuing to this day. As a whole, the ecological and geological balance has been considerably upset in this region. Natural causes aside, this results from the building of the Kuybyshev and Nizhnekamsk reservoirs and the intensive oil drilling operations. The latter at least prompt tectonic strike slips...."

Burov is convinced that this region needs extradepartmental monitoring. There must be a network of official seismic stations and regular, high-precision geodesic observation work. No one has really studied the earthquakes and their characteristics. In addition to this, there has been a clash of interests of big, strong departments in the region.

For example, while the public and "green" movements in the Tatar ASSR were fighting the construction of a biochemical plant close to Kazan, the USSR Ministry of Nuclear Power Generation successfully exploited the uproar to push through the construction of the Tatar AES. Collecting their wits, scientists and ordinary citizens came up with all manner of arguments against the AES—ranging from the existence of alternative energy sources to reasonable doubts regarding the safety of the reactors and so forth. So far, for some reason, no one has voiced the most terrible fear of all—the fear of earthquakes.

But the Tatar AES, it seems, is being built in the immediate vicinity of the nexus of the Kama tectonic fault. In the very seismic zone where, even according to the Ministry of Nuclear Power Generation's own instructions, it is dangerous to site industrial installations.

So how are the complex geological features of the region taken into account in the multivolume AES project?

We should at least begin with the fact that, for some reason, members of the Riga branch of the "Atomenergoproekt" Institute and also Kharkov, Sverdlovsk, and Tashkent designers have said that the project is geologically sound. I do not doubt their qualifications. But you must agree all the same that it is strange to shun the help of local geological services and science in this respect.

And surely it is not possible to draw up an objective picture without comprehensively analyzing geological data and carefully studying tectonic factors?

Back in February scientists at Kazan University supported the position of Professor Burov at a scientific council chaired by Professor Aleksandr Konovalov, rector of the university and now a people's deputy, and then appealed through the press for the construction of the AES to be stopped immediately and an extradepartmental commission set up.

On 30 March the USSR Council of Ministers gave instructions to set up a state commission of experts attached to the USSR Academy of Sciences Presidium Interdepartmental Council for Seismology and Earthquakeproof Construction, which is headed by Academician M. Sadovskiy. But nothing has been heard of its sessions, the chairman and members of the commission are still unknown, and, once again, it seems, Kazan scientists have been "forgotten" and the broad public is being kept in total ignorance.

"Please understand us," Boris Vladimirovich Burov fumed, "we are not opposed to nuclear power in general. In fact, we are in favor. Because we are basically discrediting the idea with an unsubstantiated, ill-considered project, clumsy construction work, and poor engineering and technological standards. The recent earthquake was a terrible warning. After all, it only takes a tilt of 1 degree to put a nuclear reactor out of action...."

Meanwhile the Tatar AES is mushrooming—after a generous sprinkling of state allocations. Our money, incidentally. It is going to cost more than R2 billion! But what will be the cost of the consequences?

The people say: "If the thunder does not rumble, the peasant will not cross himself." But maybe it is time to make the sign of the cross over this rather doubtful enterprise which is being pushed through with such haste? I am aware that there are other viewpoints. Only it would be good to express them at large ecological rallies and meetings with voters rather than behind massive office doors. Express them before the people. Looking them in the eye.

Nuclear Protestors Chided for 'Ignorance'
PM2404152789

[Editorial Report] Moscow PRAVDA in Russian 19 April 1989 Second Edition publishes on page 6 a 300-word commentary by R. Fedorov plus photographs under the rubric "Photographs and Commentary" and the heading "Matches and the Atom."

Fedorov contrasts the first photograph, which shows a burned out forest on the Kola Peninsula caused by a bonfire which got out of control, and the second photograph, which shows demonstrators protesting against nuclear power. Drawing attention to a placard carried by a little boy, saying "I do not want to be a mutant," he makes the point that "the placard only shows the ignorance of the adults who have tactlessly involved a child in an adult discussion." He also adds that "the reference to Hiroshima is hardly convincing, as Japan, which has suffered the horrors of nuclear bombardment, is building nuclear power plants." He concludes by saying that "both matches and the atom are dangerous if used thoughtlessly."

Japanese Report on Reactor Export to Pakistan 'Incorrect'
*OW2904015889 Moscow in Japanese to Japan
1200 GMT 22 Apr 89*

[Text] Mr Gerasimov, the Soviet Foreign Ministry spokesman, has stated that YOMIURI SHIMBUN of Japan has carried an incorrect report on the delivery of a nuclear reactor, soon to be made by the Soviet Union on a commercial basis, to Pakistan

At a Moscow briefing, Mr Gerasimov commented on a statement made by (Munir Khan), chairman of the Pakistani Atomic Energy Commission, which was carried by YOMIURI SHIMBUN. The statement noted that a proposal on the delivery of a nuclear reactor had been made during Foreign Minister Shevardnadze's visit to Pakistan.

Mr Gerasimov made it clear that the delivery of a Soviet nuclear reactor to Pakistan had not been discussed [during Shevardnadze's visit].

Further on Moscow Nuclear Association Center
PM2504145789 Moscow IZVESTIYA (Morning Edition) in Russian 23 Apr 89 p 1

[A. Pokrovskiy report: "Nuclear Power Stations Under International Control"; for earlier reportage on the formation of the Moscow regional center of the World Association of Organizations Operating Nuclear Power Stations, see page 14 of the 21 April Soviet Union DAILY REPORT]

[Text] The constituent documents establishing the Moscow Center of the World Association of Organizations Operating Nuclear Power Stations have been signed.

Yes, serious steps have been taken since Chernobyl to expand glasnost on an international scale. Narrow specialists have realized that only close contacts between themselves and the simultaneous briefing of the public on new developments in this sector, which is of common concern, can guarantee the conflict-free development of nuclear power engineering. Without a strong power industry the national economy cannot develop normally, and specialists see no serious alternative to nuclear power in the next 20 years. Many foreign authorities share this opinion and believe that the construction of nuclear power stations is necessary. On the indispensable condition, however, that a high standard of reliability and safety of every subassembly and mechanism at these stations is maintained. It is here that the new association of people responsible for the maintenance of strict order at these power stations is called upon to play an important role.

And so the headquarters of the Moscow regional center has been set up on the basis of the All-Union Scientific Research Institute for the Operation of AES's. The membership of this center is made up of enterprises and organizations from eight countries—Bulgaria, Hungary, the GDR, Cuba, Poland, the USSR, the CSSR, and Finland.

The aim of this new organization in our country is to enhance the safety and reliability of all existing nuclear power stations and those currently under construction by means of expanded direct cooperation between those who operate the nuclear power units and to organize exchanges of international experience.

The process of establishing this world organization began 2 years ago. At that time 130 companies—proprietors of nuclear electric power stations from 29 countries—agreed in Paris to set up such an association. The coordination center is located in London. With the establishment of the Moscow center the creation of regional centers has been completed. They now exist in Atlanta, Paris, Tokyo, and Moscow.

However, this is only a stage, albeit a significant one, in the broad international cooperation between nuclear power engineering workers. The first conference of members of all the regional centers of the World Association of Organizations Operating Nuclear Power Stations is to take place in May. It, too, will be held in our capital. This is where the world association is to be officially established.

Scholar Presents Arguments Against Nuclear Power

PM1005094189 Moscow KOMSOMOLSKAYA PRAVDA in Russian 5 May 89 pp 2-3

[Interview with Candidate of Legal Sciences Boris Aleksandrovich Kurkin, lecturer at the USSR Ministry of Internal Affairs Higher Correspondence Law School, by V. Pantyrev under the "Viewpoint" rubric: "Regarding the Sarcophagus"; date and place not given; first paragraph is editorial introduction]

[Text] "Why did I, a lawyer, take up the problem of nuclear energy? Precisely because I am able to express myself relatively freely," said our interlocutor, Candi-

date of Juridical Sciences B. Kurkin, lecturer at the USSR Ministry of Internal Affairs Higher Correspondence Law School. We know that specialists hold a different view. The editorial office is always ready to provide them with a platform and readers have an opportunity to ask them questions.

[Pantyrev] Boris Aleksandrovich, you opened your most "fundamental" article "Letters of a Hostage," published in the March issue of DRUZHBA NARODOV, with an epigraph from Andrey Platonov's "The Foundation Pit":

"Has the proletariat the right to know the truth?"

"The proletariat has the right to progress..."

What meaning do you see in these words uttered 60 years ago?

[Kurkin] The same meaning that Platonov did. The masses, in a spirit of democracy and glasnost, demand the truth. But some functionaries limit themselves to the slogans "develop," "expand," and "accelerate." It turns out that the satirical classic is not out of date. The following surely applies to construction workers on a crash hydraulic power project or to nuclear power workers: "Remaining silent is a full-time activity, an entire intellectual process, particularly if you have a practical result in mind." They remain silent and avoid open discussion by taking refuge behind a "For Official Use Only" stamp. But whom do the departments serve? Us. In other words no secrets should be kept from us.

I, for example, have been called every possible name both in print and orally: an incompetent dilettante, an ignoramus, and even an... anti-Sovietist. Yes, even in our time of restructuring! Just because I use Western sources of information, which are, by the way, completely official and come from our libraries. And where are you to obtain Soviet statistics on nuclear power if they are virtually all "classified"?

I am constantly amazed at the question why I, a lawyer, should have taken up this problem. The reason is that I do not work in the Ministry of Nuclear Power Generation and I am able to express myself relatively freely. A "specialist" has to obtain the permission of his own department to write in the press. The system is, of course, able to gag any of "its own" people who disagrees with the stance of the department concerned.

In general the level of glasnost in the nuclear power industry is inadequate. Here is a typical example: In November 1986 the journal ATOMNAYA ENERGIYA published information on the accident at the Chernobyl nuclear electric power station [AES] prepared by the International Atomic Energy Authority [IAEA]. However, the full text of the IAEA report was not published. The facts and figures most "disagreeable" to our readers were removed.

[Pantsyrev] But even since Chernobyl the representatives of the nuclear power industry assure people at every step that such accidents are virtually ruled out and that during "normal" operation the background radiation around an AES does not exceed the natural background.

[Kurkin] With all the scientific information under their control, they can even state that the radiation around an AES is far lower than anywhere else... Representatives of the Ukrainian Academy of Sciences told me that during the critical days of early May 1986, when the background radiation in the water of the Kiev Reservoir increased a hundredfold, the USSR Ministry of Health, the Ministry of Land Reclamation and Water Resources, and the State Committee for Hydrometeorology and Environmental Control immediately increased the maximum permissible concentrations a hundredfold and stated that everything was in line with the norms and that there were no grounds for alarm.

You will never discover what kind of situation there is around an AES. This has produced our mass nuclear illiteracy. We lack information and do not even have basic individual dosimeters...

No one knows the background radiation of "everyday" contamination. And yet there are unmarked burial sites containing radioactive waste from production, science, and medicine—various ampoules, flasks, gowns, and a host of other "contaminated" items—near virtually every major industrial center. People do not know about them. They cut grass nearby, graze livestock, relax in "the fresh air"... I once asked a deputy chairman of the Moscow City Soviet where the waste from research reactors is buried and how much of it there is in Moscow. His answer was terse: "I don't know." The representative of the authorities does not know, I and millions of other Muscovites still do not know...

The departmental cynicism is amazing. A. Protsenko, chairman of the State Committee for the Utilization of Atomic Energy, said frankly: "The work of AES's, including shutdowns and accidents (my emphasis—B.K.) has provided and will provide invaluable experience enabling us to judge their reliability... and makes us find and introduce new technical solutions." L. Ilin, vice president of the Academy of Medical Sciences, is equally frank: "If you are talking about transferring AES's to sparsely populated locations, it is simply not economically viable."

[Pantsyrev] But maybe Soviet reactors are securely shielded in case of accidents? It is said that there are plans for special "domes" over them and that it is even possible to build reactors which, in the event of an accident, would collapse into deep tombs built underneath them. Do we have AES's of that kind?

[Kurkin] I doubt it. If such AES's existed the relevant departments would be sure to report these achievements.

Protective domes are constructed only over VVER-1000 [light water] reactors. And as tests at the Zaporozhye AES showed, their quality is not satisfactory. Reactors of the VVER-400, RBMK-1000 [high-power pressure tube], and RBMK-1500 type do not have such domes, new AES designs are necessary for their construction.

But look at the situation that has emerged in the Crimea! It is bad enough that the Crimea AES is being built on a geological fault in a zone prone to earthquakes of at least a force of 10. A mud volcano is biding its time directly underneath it. According to current normatives in the USSR, the seismicity of an AES construction region should not exceed force 8. Nevertheless, despite the protests of highly qualified specialists in the spheres of hydrology, seismology, and geological engineering, the construction of the Crimea AES is proceeding apace. When representatives of the Crimean public complained to the USSR Supreme Soviet Presidium they soon received a comforting reply. But it transpired that this telegram in the name of the USSR Supreme Soviet Presidium was sent by... ordinary staffers of the Ministry of Nuclear Power Generation! Incredible! However, what is even more incredible is that this deception did not have any repercussions! The USSR Prosecutor's Office referred the case back... to the Ministry of Nuclear Power Generation.

[Pantsyrev] However, we know that independent U.S. specialists are going to be involved in the expert analysis of the construction of the Crimea AES.

[Kurkin] Forgive me, but I find it hard to imagine a situation in which questions affecting the U.S. nuclear power industry would be resolved by Soviet experts... Furthermore, according to the Americans' calculations, the accident at Three Mile Island will cost the United States \$130 billion! Yet the scale of that accident bears no comparison with Chernobyl, which, according to the official figures, cost us R8.5 billion. Why such a vast discrepancy in the estimates of the damage?

[Pantsyrev] It is claimed that the new generation of reliable, durable reactors will solve all these problems.

[Kurkin] Anyone with more than an elementary education understands perfectly well that there cannot be any absolutely faultless technology. But that is not the point. It took a little under 30 years to get from the idea of creating an RBMK-type reactor to the first commercial model. Therefore we are going to have to spend at least 20 years boiling water in imperfect Chernobyl-type equipment before we achieve an "absolutely safe" reactor.

Design studies for a new helium-cooled reactor are being carried out in conjunction with the FRG. Incidentally, the West German public did not allow an experimental reactor to be built on the country's territory for safety reasons. You can guess what happened next: The State Committee for the Utilization of Atomic Energy will

carry out the construction on USSR territory... Why is our country being turned not only into a nuclear dumping ground but also a test bed for Western firms' experiments?

[Pantsyrev] Incidentally, what you said about a nuclear dumping ground reminded me of reports in our press that Western countries want to bury their nuclear waste a long way from home, primarily in Third World countries, in Africa. Journalists and scientists call this a crime against the populations of the developing countries. Yet we read that the State Committee for the Utilization of Atomic Energy is proposing to Western countries that they bury waste on our territory. What is your view of that?

[Kurkin] Indeed, on 21 March 1985 the NEUE ZUERCHER ZEITUNG wrote about proposals of that kind made by the State Committee for the Utilization of Atomic Energy to our Austrian partners. Furthermore, the State Committee for the Utilization of Atomic Energy asked 15-20 percent less in payment for this "service" than China had done. Not a word about these plans was published in the press here!

It is true that Academician N. Ponomarev-Stepnoy was forced to talk about a possible plan being studied for the return of spent fuel from West German nuclear power stations to the USSR. But apart from the academician it is well known that the USSR is already taking radioactive waste from the foreign nuclear power stations which it supplies with fuel.

H. Blix, director general of the IAEA, and a number of executives of our nuclear departments have been assuring us that radioactive waste creates no special problem. But in that case why do the Western countries not bury it in their own backyards rather than trying to "push" it further away? This can only mean one thing—that radioactive waste storage facilities are not all that safe.

This is by no means an idle question, since an accident at a liquid radioactive waste storage facility near Chelyabinsk in 1957 is often mentioned in the foreign press. M. Rosen, director of the IAEA Nuclear Installation Safety Department, spoke about this at the scientific conference held at the Ignalina AES last October. The fact of the disaster was also obliquely acknowledged by I. Kuzmin and N. Babayev, scientific staffers at the I.V. Kurchatov Atomic Energy Institute, in their review of an article of mine. The disaster was also mentioned in an interview given by M. Umanets, director of the Chernobyl AES, on the "Vzglyad" program 7 April this year... It is time to tell the whole truth about this very old story.

[Pantsyrev] However, over the next 30 years or more a new technology for the burial and reprocessing of radioactive waste in special plants could appear.

[Kurkin] The problem of burying radioactive waste has not been solved anywhere in the world. We can only talk of future technologies. It is not clear how the sodium silicate solution in which the radioactive waste is placed or the actual geological formations in which it is buried will behave. After all, reliability has to be ensured for millions of years! Moreover, the activity of Soviet plants reprocessing radioactive waste is kept strictly secret. Accidents are not uncommon abroad, as far as I am aware.

It is said that the USSR is ready to accept from foreign AES's not radioactive waste but spent fuel. That is said to be quite a different matter and practically safe. Alas, so-called fission fragments of, in particular, cesium, strontium, and so forth accumulate in the spent fuel during the process of the nuclear reaction. They pose a dreadful danger to human life. Moreover, plutonium, uranium that does not take part in nuclear reaction, and radioactive waste proper are released during the reprocessing of spent fuel. That is the whole truth about the danger of "spent fuel." The specialists know this, of course, but...

[Pantsyrev] How much spent nuclear fuel is being returned to the USSR?

[Kurkin] According to official data, we take spent fuel from the CEMA countries and Finland. Twenty-two VVER-440 reactors, each using 14 tonnes of nuclear fuel annually, are operating in those countries. A tonne of burned fuel produces around 30 kg of radioactive fragments such as were released during the Chernobyl accident. (There, according to official statistics, there were "only" 63 kilos of them.) It is not difficult to calculate that more than 9 tonnes of spent fuel are returned to our country each year. Then there is our own waste!

[Pantsyrev] People continue to try to convince us of the cheapness and environmental safety of nuclear power...

[Kurkin] Specialists of the IAEA and the European Nuclear Energy Agency [ENEA] report that about 200,000 tonnes of uranium will have been stockpiled on earth by the year 2000 and that it will be possible to reprocess only one-fourth of that quantity. And the reprocessing and burial of waste constitute around 75 percent of the cost of the whole fuel cycle. The billions of dollars are not included in the cost of AES-generated power by our departmental statistics. It is not cheap to construct AES's themselves and their satellite cities and dismantling is equally costly. The sites on which the stations stood cannot be used either for farming or for other construction.

An AES's lifetime is not long: 25-30 years, that is, given ideal quality of construction and installation. However, the zirconium tubes in the reactor core of our "model" Leningrad AES named for V.I. Lenin have buckled after just 15 years in service. And what is to be done with the Rovno AES, which is subsiding on its karst foundations?

Incidentally, the construction of an AES consumes up to 20 percent of the energy which it will generate over its lifetime. In other words, every 25-30 years our country has to repeat a truly ruinous program of constructing and dismantling dozens of AES's! So you can judge for yourself whether such energy generation can be described as cheap.

[Pantsyrev] But what is to be done, after all, there is believed to be no alternative to nuclear power?

[Kurkin] Nevertheless, let us see how much energy we really need. Alas, we do not know. The problem is that we produce according to the wasteful cost-based principle. Our energy-intensiveness per unit of output, according to some estimates, is twice and, according to other estimates, five times what it is in the United States. So we will never have enough energy!

The nuclear power industry now generates around 12 percent of all the country's power, which is far less than we lose through our own wastefulness. Is it not better to learn how to manage more economically and finally introduce long-developed energy-saving technologies.

When, however, representatives of the Academy of Science say that "we cannot do without AES's," it means that they are unwittingly validating and reinforcing the cost-based economic mechanism.

If you look at the EC countries' energy program, published in the journal ATOMNAYA TEKHNIKA ZA RUBEZHOM, you will be simply amazed how large the energy supply reserves turn out to be. At how efficiently the energy of the wind, small hydroelectric power stations, and so forth can be utilized. The Soviet Union's wind power potential is 20 times higher than electricity generation in 1977!

In our country, however, one department "scores points" off another. Nuclear power workers say that the hydroelectric power industry workers have flooded the whole country, so let's increase AES construction. The hydroelectric power workers maintain, for their part, that since nuclear power is harmful and dangerous, let us develop hydroelectric stations. And both departments "develop"...

[Pantsyrev] The "peaceful" use of the atom has not proven all that peaceful in fact. And the problems of nuclear power affect the vital interests of literally everyone. In other words, a nationwide referendum on the energy program is essential.

[Kurkin] I consider that mandatory. Society is entitled to know the risk it runs when it puts its cash and its life into the hands of the nuclear power departments.

Minister Discusses Nuclear Power Program
LD1505125889 Moscow TASS in English
1224 GMT 15 May 89

[Text] The Soviet Union comes out for an international safety regime in nuclear engineering, for technical cooperation, exchange of information and experience. This was stated today by Nikolay Lukonin, the Soviet minister for nuclear engineering, who addressed a constituent conference of the World Association of Nuclear Operators (WANO), which opened here today.

Nikolay Lukonin recalled that bans on information about the operation of nuclear power plants and their ejections into the environment had been lifted in the Soviet Union. Experts of the International Atomic Energy Agency were invited to this country for the first time in 1988 to check the operational safety of the Rovno atomic power plant. IAEA experts were invited this year for similar purposes to the Ignalinskaya power plant and the Gorkiy atomic heating station.

Speaking of the level attained by Soviet nuclear engineering, the minister said that on January 1st, 1989, the country had 47 power generating blocks with an installed capacity of 35.4 million kilowatts. The annual output of electricity at atomic power plants amounted to 1988 to 216 billion kilowatt hours or to 12.6 percent of the total generated in the Soviet Union. Pre-operational adjustment jobs are all but completed on three more power blocks with a capacity of one million kilowatts each.

Continued in the USSR now, Nikolay Lukonin went on, are scientific and designing efforts to raise the reliability and safety of generating blocks with different types of reactors. Information systems to report on equipment failures, different incidents and measures taken in connection with them have been created. Today, such systems make it possible to prevent equipment failures and carry out probability analyses of the safety of atomic power plant equipment and systems. Programmes have been worked out for the mathematical modelling and analysis of unsteady regimes of the operation of atomic reactors, means for controlling the operation of their elements.

All this has appreciably enhanced the safety and dependability of power generating blocks, has reduced by 27 percent the number of unplanned reactor stoppages in 1988 as compared to 1987, and by almost 50 percent during the first four months of this year as compared to the corresponding period of last year. The minister also said that the average radiation effect on the personnel of all the atomic power plants in the USSR amounted to 0.66 ber in 1988. At the Chernobyl atomic power plant it dropped from 1.51 ber in 1987 to 1.03 ber in 1988.

Further development of nuclear engineering in the USSR, Nikolay Lukonin said, will involve the expansion of operating stations and the construction of new power plants. Work is under way on new extra safe reactors, such as the 1,000 megawatt water-cooled reactor, the high-temperature gas-cooled reactor and others.

CANADA

Radioactive Waste Leaks Into Saskatchewan Lake
51200023 Toronto *THE GLOBE AND MAIL* in
English 8 Apr 89 p A3

[Text] Prince Albert, Sask—Radioactive waste material leaked into Wolf Lake near the Key Lake uranium mine in northern Saskatchewan this week, a spokesman for Cameco, operators of the mine, has confirmed. Rita Mirwald, manager of corporate affairs for Cameco, said the leak occurred about 740 km north of Saskatoon on Sunday. Lynn Price, director of environmental safety for the Key Lake mine, said that when the pipeline that carries waste from the mine to the primary catchment leaked, it sprayed sand that cut the cables to the alarm system that would normally warn of a leak. A visual check the next morning caught the problem. Mr. Price said the spill does not pose a threat because Wolf Lake is still frozen and as the spill of water from the mine thaws it is being removed.

FEDERAL REPUBLIC OF GERMANY

Joint FRG-USSR Research on Germanium Neutrino Mass
M1890151z Bonn *TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN* in German
16 Jan 89 p 9

[Excerpts] In early December 1988, FRG and Soviet physicists signed an agreement on an important joint experiment to investigate neutrino masses. [passage omitted]

One interesting concept is based on the characterization of the double beta decay, in which two neutrons are transformed simultaneously into protons inside an atomic nucleus. This is an extremely rare process. Particularly favorable conditions have emerged for a joint FRG-Soviet project to identify double beta decay in the germanium 76 isotope. The USSR is the only country to possess the necessary quantity of strongly enriched germanium 76. This material is very valuable because it is costly to produce. The Soviet project partner is the Kurchatov Institute of Atomic Energy in Moscow.

On the FRG side, the Max Planck Institute of Nuclear Physics in Heidelberg provides the theoretical knowledge of double beta decay, as well as practical experience in developing disturbance-free detectors and the required high precision measuring equipment. This project can only be tackled by combining the specific contributions of the two countries.

In early December the first 7.5 kg of the valuable germanium isotope were delivered to Heidelberg. Work on the project can now begin.

Further Transfers of Military Technology Reported

51003004 Vienna *PROFIL* in German
8 May 89 pp 29-31

[Article by Herbert Langsner and Alan George: "...And Tomorrow the Entire World"; first paragraph is PROFIL introduction]

[Text] Siemens, Brown Boveri, and other German firms are working on the Iraqi DOT rocket plant. Romania, too, probably received West German arms technology.

Among the 12 men sitting together in an office building on Palestine Street in Baghdad on 8 June 1988, the mood was depressed. Some simply feared for their lives, others feared for their money.

Work on a highly secret project was the link that bound them all: an industrial complex with the code name DOT, or simply "project 395"—both abbreviations for a plant whose purpose was the production of medium-range rockets capable of delivering an atomic warhead.

The chief engineer, Titus Habian, a technician from Linz, opened the "internal coordination meeting," as the minutes, which were prepared later, refer to the crisis meeting. According to the transcript, Habian "informed the group of current company problems," and he reminded everyone "on this occasion, of their duty to maintain the strictest secrecy" (even where the project's subcontractors were concerned).

He continued: "Vacation trips to Europe should be avoided whenever possible until certain matters were clarified by the firm's management," because in Europe, as Habian pointed out to those assembled, each one of them was in danger of losing his life.

The reason for all the excitement in Baghdad had been described just a week earlier, May 29 in *BILD AM SONNTAG*: "Bomb attacks on German businessmen" was the title of the cover story (see facsimile on page 31) [not reproduced]. One Ekkehard Schrotz, "a businessman from Heidelberg, Director of a mysterious export company with headquarters in Monaco" (*BILD AM SONNTAG*), was the target of the attack.

Schrotz, who was fortunate in Monte Carlo because the car bomb in his Peugeot exploded a few minutes too soon, is, indeed, on the Board of Directors of a particularly "mysterious" conglomerate of companies known as "Consen." The "Consen" group, a team of high-level arms experts, maintains a network of subsidiaries and affiliates in Germany, Austria, Monaco, and Switzerland (Ifsat, Condor, Conchem, Desintec, Delta Consult, Delta System, etc.). Under different company names in each case, the group is engaged in the construction of rocket facilities, as well as the sale of the requisite "know how." With "Consen" aid, such factories have already been

built in Argentina ("Condor") and Egypt. Rocket specialists have been working on a third plant in Iraq under the project name DOT (PROFIL 17/89).

Those responsible for the attack on Schrotz, who represented themselves as "protectors of Islam" to the French news agency, Agence France Presse, were also aware of that fact. They claimed that Schrotz had been "condemned to death because of his crimes in the service of Saddam Hussein. He built rockets for Saddam Hussein." Yet, according to the protectors of Islam, who were evidently Iranian, Schrotz was not the only one. They said that "all collaborators in this crime" would be punished.

What was not published in BILD AM SONNTAG was the fact that a few days after the bomb attack on Schrotz, unidentified perpetrators broke into "Consen's" offices in Zug, Switzerland and rifled through the files. Among these files were lists of those firms and individuals who had played a part in the construction of the "Consen" rocket plants.

It was precisely this fact that was the cause of anxiety among the participants of the coordinating meeting in Baghdad. Some of them were employed by the Graz-based engineering firm Feneberg, the architectural and structural inspection firm involved with DOT, and some were employed by the Salzburg firm Delta Consult, one of the many subsidiaries of the "Consen" group.

In the final analysis, these attempts at intimidation on the part of the "protectors of Islam" were fruitless. The rocket factory, which consists of three facilities near Baghdad, was completed in spite of everything. The first operational test took place 6 weeks ago.

If Iraq's warlike chief of state Saddam Hussein now has rocket systems at his disposal, with which he can send nuclear warheads or poison gas bombs across distances of 1,000 km, he has Austrian, and primarily German firms to thank for it.

Similar to the Rabia affair, in which it became apparent that Germans were involved in the construction of what was suspected to be a poison gas factory in Libya, once again, prominent firms are on course for a substantial scandal—one that will probably have consequences involving criminal prosecution.

From documents available to PROFIL, it is apparent that Siemens-Germany, for example, worked on behalf of DOT. For 175 million schillings, the German electronics firm provided "switching devices, transformers, and other devices for the distribution of electricity" to DOT, as Siemens spokesman Horst Siebert admits when reference is made to the PROFIL documents. "But those

were standard products that could be used in any industrial plant." He claimed that naturally, Siemens had had no idea that the "current distribution and switching equipment" was intended to control rocket fuel mixing equipment.

The people at Brown, Boveri, Germany were just as much in the dark when they sent "cable, installation material, or switches" to Baghdad. Firm spokesman Wilfried Klewin provided assurances that "under no circumstances were the export regulations of the FRG violated, nor was the War Materiel Control Act breached."

Everyone acted in good faith. The chief executive officer of the Austrian construction firm Ilbau, Hans Peter Haselsteiner, swore that his company knows "nothing whatsoever about a DOT project." To be sure, Haselsteiner admitted that Ilbau shipped goods continually to various customers in Iraq, and that it might be possible that Ilbau products found their way to the DOT rocket factory.

To be sure, they have, as the DOT correspondence shows. "Ilbau people," an engineer who worked on the DOT construction site confirmed, "delivered and installed special doors and windows that had to be airtight and antistatic. The so-called blowout walls came from Ilbau as well."

Blowout walls are aluminum walls that are used in so-called resistance buildings. Three side walls and the roof of these resistance buildings, which are well-suited for explosion tests, are particularly massively constructed, while one component, the blowout wall, is loosely mounted on purpose. If something goes wrong during an explosion, the entire building does not collapse; only the blowout wall is blown out.

The ex-DOT engineer knows that "whoever was on the DOT construction sites had to realize that an arms factory was under construction."

Each sensitive building, the largest are over 20 meters high, is protected with an earthen wall (see photo) [not reproduced]. These process buildings, (as they are called in the trade), are accessible only by means of subterranean tunnels.

In several process buildings, for example, rocket firing is tested.

The hollow body of the projectile is secured in a sort of gigantic vise, then the fuel is ignited. In this way, flight can be simulated, and calculations can be made to determine whether the rocket would fly the way it should under emergency conditions.

The technicians and assemblers from Siemens and Brown Boveri, thus could not have overlooked the fact that they were installing electronics for a military facility.

Yet the list of Germans involved in DOT can be expanded without any difficulty. One firm, Weiss Technik, provided hot and cold chambers. Installation took place a few weeks ago, and it was undertaken by a Weiss Technik subsidiary based in Lower Austria.

The Hamburg firm Nickel provided climate control technology, and a firm from Aschau called Schaeftlmaier provided electronic measurement and testing instrumentation.

Most of the DOT workers from Europe were old acquaintances, because in Egypt, where the "Consen" group built a plant for the Ministry of Defense that was the same as the one in Iraq, the same firms were involved as the ones now at work in Iraq. The major difference is that in Cairo, it was not the Austrian construction firm Ilbau, but the prominent German construction firm Walter Thost Boswau that landed the job.

The technological heart of the "Consen" plants, however, came from the many-sided German national arms concern Messerschmidt-Boelkow-Blohm (MBB), which is currently the focus of a great deal of attention as a result of its possible merger with Daimler-Benz.

The MBB subsidiary Transtechnica already provided the technological equipment for the military research center SA'AD 16 in the Iraqi university city of Mosul. Since the beginning of March, the State's Attorney's office in Bielefeld has been looking into this case.

The "Consen" group, too, consists of former MBB technicians. Ekkehard Schrotz, the target of the attack in Monaco, had worked there, his "Consen" cohort Hermann Karl Schmidt had once worked for MBB, and the most recent "Consen" Director, Karl Adolf Hammer, was even the leader of the Armaments Technology division of the Munich-based armorer until 1987.

In addition, MBB, at first quite officially, then more quietly, was involved in the "Consen" rocket projects in Argentina and Egypt.

Wherever "Consen" was, it turns out, there, too, was Messerschmidt-Boelkow-Blohm.

For this reason, what the former DOT worker said to PROFIL sounds quite plausible, namely, that technical progress was monitored by Iraqi specialists who had been, in turn, by their own admission, trained by MBB in Mosul (SA'AD 16) and in Germany.

In point of fact, documents that have also been made available to PROFIL show that MBB held training courses for Iraqis.

The fact that German and Austrian firms helped (and continue to help) the dictatorial—and until the summer of 1988, warring—regime in Baghdad with the construction of a high-tech rocket system, is a political time bomb.

As soon as rumors about a possible involvement on the part of MBB began to circulate (there was no mention at the time of Siemens or Brown Boveri) in connection with Iraqi rocket development, the German Federal Government was bombarded with questions from the Greens and the SPD [Social Democratic Party].

On April 19, Erich Riedl, Secretary of State responsible for such matters, answered a question about connections between MBB and the "Consen" group by saying: "It is impossible for the Federal Government to provide information about interconnections that may exist between two private firms in the course of their normal business."

The courts will now probably collect such information. Whereas the transfer of know how is on no account a punishable offense in Austria (for which reason "Consen" shifted its headquarters to Salzburg), German managers, according to the External Economic Law, must even run the risk of imprisonment if they provide militarily useful technology and machinery to sensitive states, such as Iraq.

"If, for example, a basically neutral computer is wittingly delivered for military purposes," Dieter Vogel, spokesman for the German Federal Ministry of the Economy, knew, "there could be problems for the firm."

Problems that would keep a few of the men at the firms of Siemens, Brown Boveri, or MBB quite busy.

They would also keep the politicians in Austria and the Federal Republic of Germany busy. Government insiders in Bonn fear that the United States intends to make German firms' arms exports to Iraq and other critical countries an issue in the near future, and it threatens to do so on the heels of the discovery of the German aid to Qadhafi's Libya in the matter of poison gas.

In the meantime, the next bomb is already ticking in Bonn.

The PROFIL informant, who spent more than 2 years on the "Consen" construction sites in Iraq and Egypt, claims to have heard quite often that Romania, too, was supplied with the same weapons plant as Argentina, Egypt, and Iraq.

If that is correct, it means that weapons technology of the NATO member state, the FRG, is being passed on to the Communist terrorist regime of Nicolae Ceausescu by "Consen" companies located in Austria.

And all this with the nearly compelling probability that it is happening with the full knowledge and cooperation of the MBB concern, which is jointly owned by the States of Hamburg, Bremen, and Bavaria.

The painful irony of fate is that while NATO argues about the military threat posed by the Warsaw Pact, German technicians are preparing to turn over an atomic rocket factory to Romania.

The fact that "Consen" is also building for Bucharest can hardly be denied any longer.

The PROFIL informant who also confirmed his information for the German magazine DER SPIEGEL, remembered: A "Consen" technician named Wistuba complained repeatedly on the DOT Iraqi construction site that he had "just come from Romania," where he had used "exactly the same machine." He meant a computer-controlled milling machine for super-exact production of hollow bodies for rockets.

Not only the gossip of the "Consen" people, but government offices in Bonn and Washington confirm that the lively trade in rockets with Ceausescu is more than just a rumor.

Finally, and this completes the chain of evidence—the Romanian Minister of Industry and the Iraqi Minister of Industry and Military Industrialization signed a treaty of cooperation between the two nations just barely 3 weeks ago on 20 April.

Just at a time when both rocket plants should be ready to begin operation.

If "Consen" did build in Romania, then it was probably not only with the aid of MBB technology, but, as was the case in Cairo and Baghdad, with the cooperation of other German firms.

Clear indications of experience in the matter of covering tracks are present. Thus, sensitive equipment for the Iraqi plant was not delivered directly to Iraq, but to politically respectable Egypt first, then to be transported via ship or airplane to its actual destination.

The DOT technicians usually traveled via the same circuitous route from Egypt to Baghdad—without a visa, of course. "We were always," the DOT engineer recalls, "taken past Iraqi immigration by Iraqi security people, and brought directly to the hotel."

None of the DOT crew members was officially registered. Whoever worked on the project was quasi not even present in Iraq.

The deal with Romania must have been like that, or similar to it: quite quietly and via detours that were intended to conceal the true location where the people and the machinery were going to be used.

The dam that "Consen" has erected around itself seems to be breaking, however. "Compared to what is going to confront us now," one German diplomat said, "the Libya affair was a joke."

SPIEGEL Reports Missile Aid to Romania
AU0805102389 Hamburg DER SPIEGEL in German
8 May 89 pp 166-68

[Unattributed report: "The Same Plant Is Under Construction in Romania"]

[Text] The missile technology of the Munich weapons concern Messerschmidt-Boelkow-Blohm (MBB) has apparently also been supplied to the East Bloc from Argentina via Egypt and Iraq: In Romania a plant for intermediate-range missiles capable of carrying nuclear warheads is allegedly under construction—on the basis of plans that were drafted with German help for similar plants near Cairo and Baghdad.

The meeting of the ruling Communist Party that ended on 14 April should have actually been a routine session. However, party leader Nicolae Ceausescu announced a sensation on the closing day:

His country is now in a position to produce nuclear weapons: "Technically, we are able to do that."

The dictator did not reveal why the socialist republic, which has been plunged into misery by its megalomaniac leader, should operate such a nuclear plant that involves enormous amounts of money. He did not disclose either how his military should use the weapons of mass destruction against an enemy in case of need: Romania's obsolete Air Force is hardly in a position to launch a nuclear strike, and the four dozen Soviet-made launchers for short-range missiles that are capable of carrying nuclear warheads are more of a threat to Romania than to potential foes.

Another sentence of Ceausescu's speech, however, which did not attract much attention at the beginning, hints that Romania might already have made arrangements for the transport of future nuclear warheads. The egomaniacal dictator stated that Bucharest, in competition "with the best products that are manufactured worldwide," is able to produce "equipment and machinery of all types"—including intermediate-range missiles capable of carrying nuclear warheads, according to an insider.

A gigantic plant is currently under construction in Ceausescu's empire, similar to the ones in Iraq and Egypt (DER SPIEGEL 18/1989), an engineer specialized in missile technology and projects of this kind, who was involved in the construction of the Iraqi and Egyptian plants, reported a few days ago. His familiarity with the details, original plans, and business documents in writing are proof of the authenticity of his statements.

He learned details about the Romanian project from reliable sources: The manager, Wistuba, "who was also responsible for the production facilities in Iraq, repeatedly talked about his work at the Romanian plant."

According to the report, Wistuba arrived in Iraq in 1988 to "adjust a precision machine, by means of which missiles bodies [Raketenhuellen] can be manufactured with an accuracy of hundredths of millimeters." When he arrived, Wistuba stated that "this is the second time this week" that he "installed such a thing." He had "just done the same thing in Romania."

When asked about the plausibility of such a deal which is hardly believable, members of secret services nod their heads meaningfully. Some admit openly that they have already heard of the East-West missile deal. Bonn government officials see their worst fears confirmed.

Through sensational disclosures, Washington may try to burden the atmosphere of the upcoming talks of Soviet head of state Mikhail Gorbachev during his visit to the FRG, a West German diplomat warned last weekend: "Something is brewing here." As early as at the beginning of last week, officials feared that "West German missile aid for the Warsaw Pact may be uncovered."

U.S. Government representatives visited the responsible ministries in Bonn and the FRG Embassy in Washington "two to three times a week" during the past few years, warning against alleged illegal exports by West German companies to the East Bloc or to "unstable states in the Third World."

"They have vaults full of material implicating German companies," an official from a Bonn ministry stated, thus confirming hints by high-ranking U.S. politicians.

Last week, the former under secretary in the Defense Department, Richard Perle, complained in front of a Senate committee that over 100 U.S. complaints have been filed because of German participation in Pakistan's nuclear arms program. Concerning explosive German deals with Iran, Iraq, Syria, and Libya, Washington even filed 150 complaints, Senator Jesse Helms had pointed out earlier.

It has become clear now how the production facilities for the Condor missiles, which were first developed by the Munich weapons concern MBB for Argentina from 1979 on, apparently reached communist Romania via Egypt and Iraq—at a time when the Western alliance is divided over how many new missiles NATO needs to be able to withstand in the future the alleged overwhelming military superiority of the Warsaw Pact.

According to internal MBB protocols mentioned by Mainz ZDF television network, the Munich company knew very well that military eggs should be hatched in

the "nest of the Condors," as an Argentine paper called the production plant in Cordoba province which is partly located underground.

Despite the fact that Bonn forced MBB to abandon the Argentine deal in 1985, its subsidiary Transtechnica, which was especially founded for the "worldwide marketing of MBB know-how," continued to supply most sophisticated missile technology to Buenos Aires.

The deal was mediated by the Consen group, a complicated conglomerate of Austrian, Swiss, and FRG companies. Former MBB managers have held leading positions within Consen from the beginning.

MBB won contracts in the Middle East as early as in 1984, with the help of the Consen companies. Gigantic weapons research centers were established in Heluan in Egypt and in Mosul in northern Iraq (Saad 16 project) where missiles and chemical weapons are allegedly being produced (DER SPIEGEL 13/1989).

The Public Prosecutor's Office has initiated investigations against West German companies because of their involvement in Saad 16. MBB-Transtechnica, the main supplier of technology, was also searched.

Internal MBB documents contradict official reports, according to which Saad 16 is a civilian project. Explicit orders were given in Munich to carry out the delivery in small parts that allow no conclusions as to the entire project.

The aim of the MBB deal was also clear from the beginning: Entry into the market and production at a later stage.

The Consen group was also the main contractor of the—nearly identical—enormous production plants which were heavily protected and installed underground in Abu Saabl [spelling as published] near Cairo and in three places south of Baghdad (Project 395). "The same plant is under construction in Romania," an expert who was familiar with the project pointed out.

To coordinate the Egyptian project, for which the Egyptian Defense Minister was directly responsible, a special office of his ministry was opened at the Salzburg Consen branch. The Iraqi project 395, which was started a little later, was also promoted at the highest level. Dr Amir al-Dadhi [spelling as published], the son-in-law of the powerful Saddam Husayn, was personally responsible for this project.

The Consen group developed special camouflage tactics for the deal with Iraq: All deliveries reached the country via Cairo. Even the employees had to travel to Iraq via Egypt—usually without visas in order to leave no traces.

A large number of enterprises from the FRG was involved. It is still unclear, however, whether they were aware of the explosive nature of the deals:

- The Walter Thosthi Boswau (WTB) International AG company, a subsidiary of the German WTB, based in Zug in Switzerland, carried out construction work in Abu Saabl. Wilhelm Vullride, project manager of Saad 16 until 1985 and general manager of Consen since 17 January 1989, is allegedly a member of the supervisory board of WTB Internal.
- BBC Mannheim supplied all the electrical equipment to Iraq and Egypt, and the Siemens concern sold the switching computers.
- The foreign department of the air conditioning equipment manufacturer Nickel in Hamburg delivered equipment by means of which the temperature can be stabilized with an accuracy of fractions of degrees in fuel stores, mixing bunkers, and filling towers in order to prevent the self-ignition of the dangerous chemicals.
- The small Schaeftelmaier company from Aschau provided mixing plants for the preparation of propellants and special X-ray equipment for examining solid fuel stage containers.

Swiss, Austrian, and Italian enterprises were also involved. Many of them are allegedly also participating in the Romanian deal—possibly in a similarly obscure way as in the Iraq project.

When a bomb attack on a Consen manager at the beginning of May last year made it clear that, despite all efforts to keep the project secret, Baghdad's enemies must have learned of Project 395, security measures were tightened even more. A protocol of a crisis meeting of 6 May 1988, signed by project manager Titus Habian, contains the following passage: "Vacations in Europe should be avoided, if possible, until clarification of the matter by the company's leadership."

MBB also tried to cover up its activities as a result. According to an insider, "Iraqi engineers who had been trained for the production by MBB within the framework of Saad 16 appeared frequently" at Project 395.

The cold run tests, during which the completeness of the plants is examined, have been completed both in Egypt and Iraq. The hot run tests are scheduled for the coming weeks, as well as performance tests for machinery and devices. According to the agreement, the production start should then be supervised by MBB experts.

Money will only be provided "when the first missile that is capable of flying leaves the plant," a former project leader has disclosed.

According to secret service reports, two intermediate-range missiles are ready for testing in the Argentine "nest of Condors." U.S. pressure has so far prevented the first trial start.

Work in Romania has probably reached the same stage as in Iraq. Bucharest has already made arrangements for further cooperation with the Condor sponsor states:

At the end of 1987, Ceausescu granted a loan worth \$200 million to Egypt "for not further specified development projects" (NEUE ZUERCHER ZEITUNG) on the occasion of a visit to Cairo. On 20 April this year Ceausescu's industry minister signed a cooperation agreement in Baghdad. His partner was the Iraqi minister for military industrialization.

Government Rejects SPIEGEL Report
AU0805142789 Hamburg DIE WELT in German
8 May 89 p 1

[("DW" report: "Does Romania Produce Nuclear Weapons After All?")]

[Excerpt] Bonn/Bucharest—A spokesman of the Economics Ministry in Bonn has rejected yesterday's reports [7 May] which said that Romania is in a position to build intermediate-range missiles capable of carrying nuclear warheads with the help of Western technology. Referring to a corresponding report published by the news magazine DER SPIEGEL, the spokesman stressed that he does not know of such information. Bonn would in no case permit such deliveries. The Chancellor's Office announced that it has not received such information recently from German intelligence services. [passage omitted]

FRANCE

Ministry Denies Cooperation on Iraqi Reactor
AU0705130589 Paris AFP in English
1150 GMT 7 May 89

[Text] Paris, May 7 (AFP)—France denied Sunday that it was negotiating the rebuilding of an Iraqi nuclear reactor destroyed in an Israeli air raid eight years ago.

There were "no on-going talks on the subject," a Foreign Ministry spokesman said, contradicting an Iraqi official who said France was negotiating to rebuild the Tammuz reactor north of the Iraqi capital Baghdad.

The spokesman added that reconstruction of the facility, which was being built with French assistance and was bombed by Israel in 1981, had been raised by Iraqi officials in the past and was brought up again recently.

In an interview with a Gulf paper published Saturday, Iraq's Industry Minister Husayn Kamil said Iraq was negotiating with France to rebuild its Tammuz reactor.

He told the United Arab Emirates AL-KHALEEJ newspaper that Iraq was "determined" to rebuild Tammuz for "peaceful" uses, despite Israel's threats to destroy any Iraqi nuclear facility or industrial plant endangering the Jewish state.

In March, Iraqi President Saddam Hussayn said Saudi Arabia had pledged financial aid for the reconstruction.

Mr Kamil stressed that Iraq had no wish to amass a nuclear arsenal and denied that any deal had been struck with Egypt or Argentina to produce a missile that could be equipped with a nuclear warhead.

UNITED KINGDOM

Planning for Simpler, Smaller Reactor Backed
51500120 London THE DAILY TELEGRAPH in English 29 Mar 89 p 2

[Text] Backing for the design of a new simpler and smaller type of nuclear reactor has been raised, the Atomic Energy Authority announced yesterday.

"We are confident that we shall be able to get sufficient interest to demonstrate the funding is forthcoming," said Dr John Gittus, the authority's information officer. But he would not disclose the identities of those interested in funding the design of a small pressurized water reactor.

The authority, Rolls Royce and two American companies, Stone and Webster and Combustion Engineering, are to bid for a six-year design phase project for the reactor in which the United States Department of Energy has offered up to \$50 million (about 29 million), around half the anticipated costs.

The concept being put forward by the British consortium is called Sir, the safe integral reactor. The conventional approach to nuclear safety, as seen in Sizewell, is to add on safety systems. The aim is to come up with a smaller, simpler and possibly safer reactor.

Although the authority is confident it can raise the \$50 million design phase costs, Dr Gittus dismissed reports that it had plans to build four reactors, which would be the equivalent of an ordinary pressurized water reactor in output.

"It is simply a target to have in mind, but I would not put great emphasis on the figure."

Dr Gittus said the cost per kilowatt of energy produced by Sir would be competitive with other forms of generation and that the authority hopes to build the first Sir at its site in Winfrith, Dorset.

Britain's nuclear power programme remains the worst performer in Europe, according to the latest survey published today in the industry magazine, Nuclear Engineering International.

Only India has a poorer record, according to the 1988 statistics of nuclear station achievement in non-Comecon countries.

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